DEVOTED TO
TEXTILE
WET-PROCESSING
•
CHEMISTRY
BLEACHING • DYEING
PRINTING • FINISHING

NOVEMBER 1, 1948
VOLUME 37, NO. 22

AMERICAN DYESTUFF REPORTER

New

PONSOL BRILLIANT ORANGE RK PASTE
Reg. U. S. Pat. Off.

A brilliant anthraquinone vat orange . . . for cotton and viscose-process rayon in all forms! Very good resistance to chlorine, washing, crocking, hot moist pressing, dry cleaning and salt-water spotting . . . good fastness to light and peroxide bleaching. Reduces slowly, penetrates evenly and thoroughly, has a medium rate of exhaust. This new vat color is especially recommended for application to fabrics that must withstand light, weathering, or wet processing. E. I. du Pont de Nemours & Co. (Inc.), Dyestuffs Division, Wilmington 98, Delaware.

Du Pont Dyestuffs

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING *THROUGH CHEMISTRY*

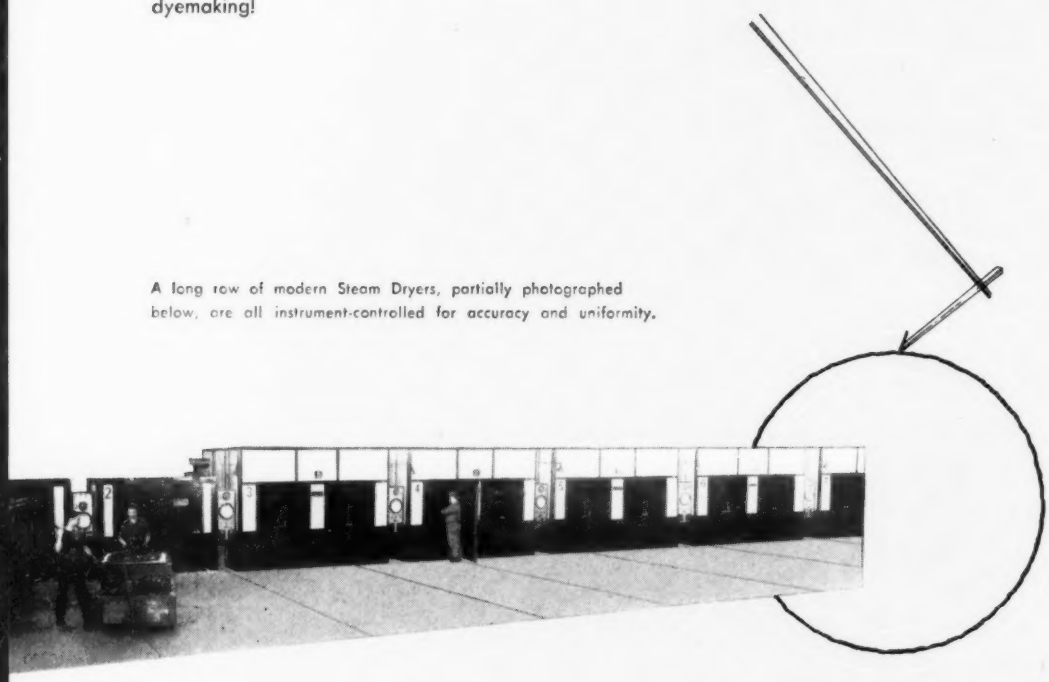
OFFICIAL PUBLICATION
of the
PROCEEDINGS
AMERICAN ASSOCIATION
OF TEXTILE CHEMISTS
AND COLORISTS

controlled scientifically

To KEEP IMPURITIES OUT of all our dyestuffs, the modern and exclusive equipment *throughout our plant* is as fine and accurate as the finest laboratory equipment. The dryers, for instance, are instrument-controlled to prevent Althouse dyestuffs from "breaking down", so that shade and dyeing properties are more uniform . . . another advantage of Althouse PRECISION dyemaking!

"to the nth degree"

A long row of modern Steam Dryers, partially photographed below, are all instrument-controlled for accuracy and uniformity.



pace-setter in precision dye-making

ALTHOUSE
Chemical Company, Inc.
READING • PA.

PERMA - PAR R

An improved cation action finish

RESISTANT TO WASHING & DRY CLEANING

REFINED PRODUCTS CORPORATION

Lyndhurst • New Jersey

***Manufacturers of PERMA-CIDE, the approved, outstanding, mildew-proofing agent**

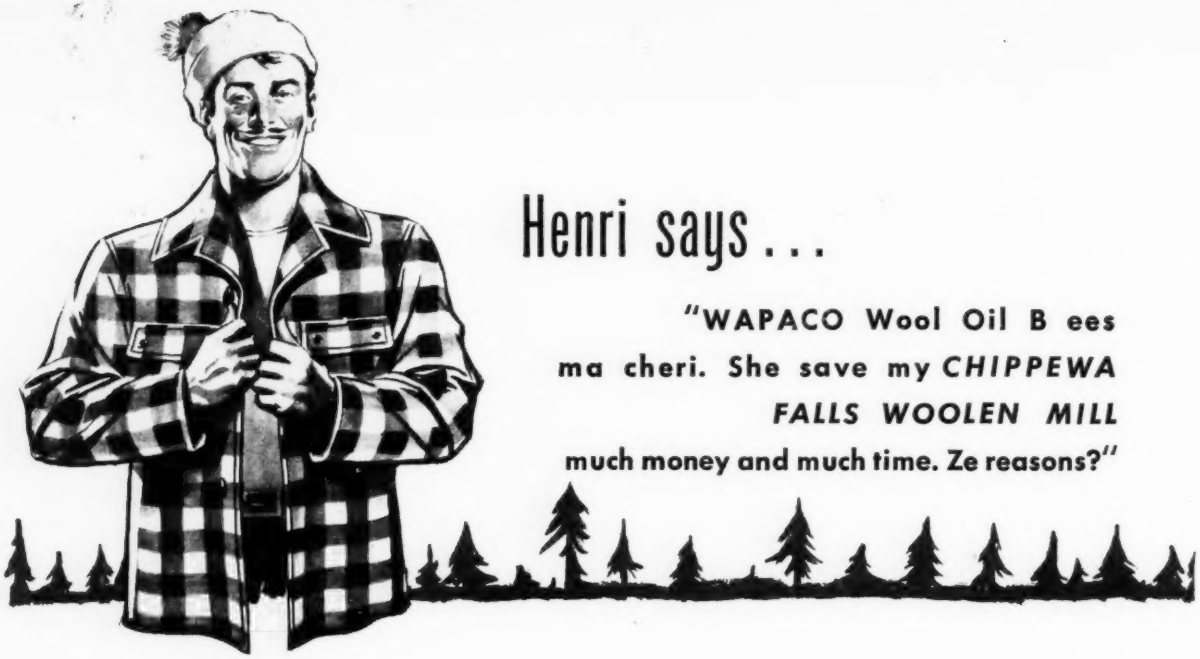
Southern Representative: DYER S. MOSS, 1301 Liberty Life Bldg., Charlotte, North Carolina

New England Representatives: E. L. LEGG, P. O. Box 597, Providence, R. I.
CLARENCE E. MOSS, 19 Wilson Ave., Rumford (16), R. I.
CARBIC COLOR & CHEMICAL CO., INC., 68 Pine St., Providence, R. I.

California Representative: SIDNEY SPRINGER, 2300 S. Vermont Ave., Los Angeles 7, California

Canadian Selling Agents: Carbic Color and Chemical Co., Inc., 56 McNab Street South, Hamilton, Ontario

Exporting Agent: Chem-Col Company, 82 Wall St., New York City



Henri says . . .

"WAPACO Wool Oil B ees ma cheri. She save my *CHIPPEWA FALLS WOOLEN MILL* much money and much time. Ze reasons?"

WAPACO WOOL OIL B:

1. Gives us CONTINUAL HIGH YIELDS OFF CARD.
2. Eliminates GUMMING of Card Wire and Pitting.
3. Assures SCOURABILITY . . . using less soap and doing a superior job.
4. Allows EXACT ESTIMATE OF PRODUCTION. We process 1500-2500 pounds without stripping cards.
5. Eliminates OXIDATION.
6. Can BE LEFT AROUND INDEFINITELY IN THE GREASE.
7. Produces LESS ENDS DOWN AT THE RUB APRON . . . for more uniformity.
8. PENETRATES . . . does not lie on the surface.
9. MIXES IN HARDEST OF WATERS . . . hot or cold.
10. Allows FIRST BREAKER TO STRIP AS EASILY AS FINISHING BREAKER. Also will strip to base of the wire on all breakers, doffers, workers and strippers.

A *Watson-Park* DEMONSTRATOR WILL BE GLAD TO DISCUSS YOUR PROBLEMS WITH YOU. OR WRITE FOR FURTHER INFORMATION.

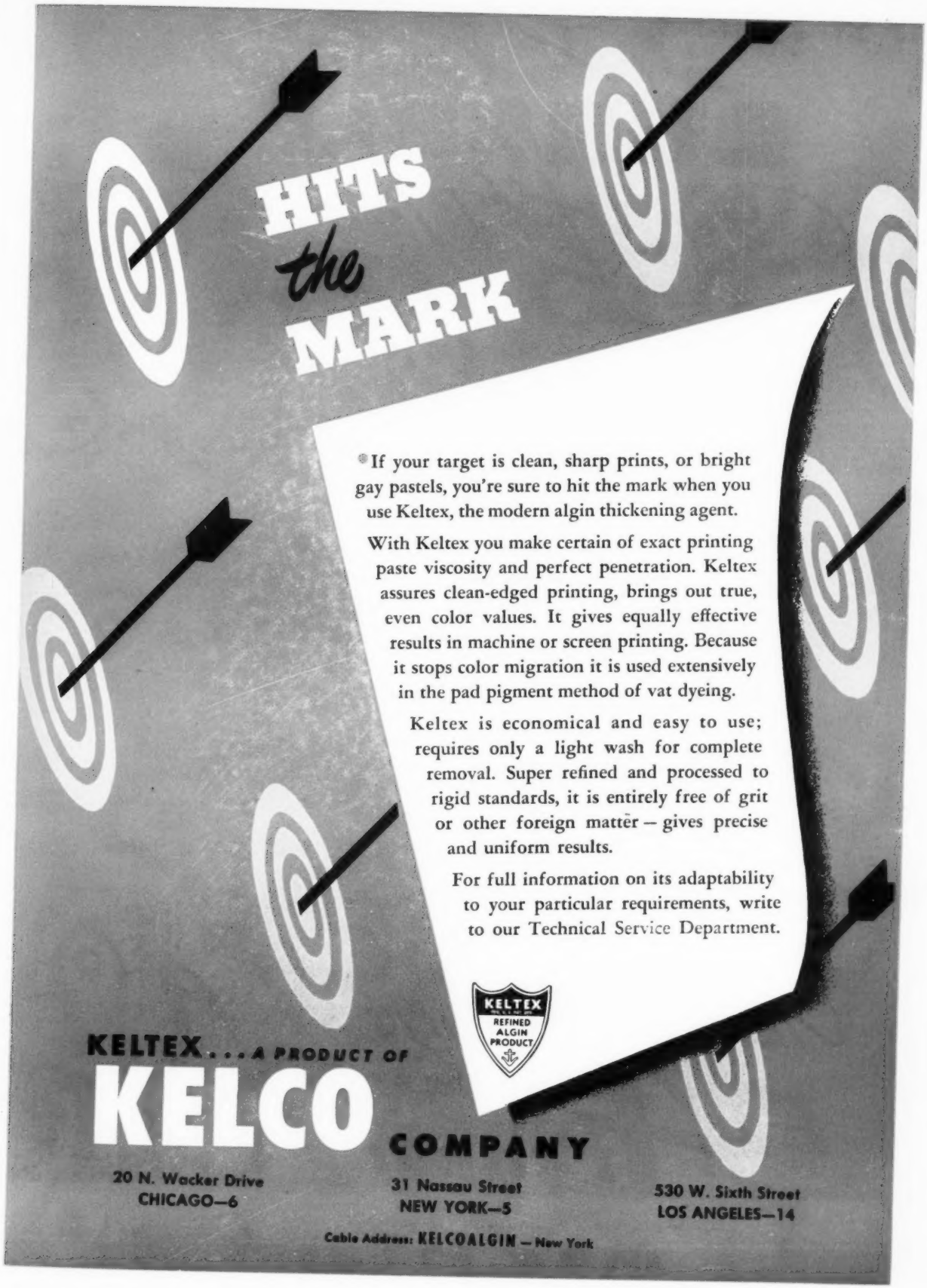
WATSON-PARK CO. Wapaco Leads BOSTON, MASS.

FACTORY, LOWELL JCT., MASS.

WATSON-PARK COMPANY

261 FRANKLIN STREET BOSTON, MASS.

American Dyestuff Reporter, Vol. 37, No. 22. November 1, 1948. Published every other Monday. Copyright 1948, by Howes Publishing Co., Inc., One Madison Ave., New York 10, N. Y. Domestic subscription, $5.00; Canadian, $6.00. Foreign, $10.00. Entered as second-class matter, Nov. 6, 1919, at the New York, N. Y., Post Office, under the act of March 3, 1879.


HITS
the
MARK
If your target is clean, sharp prints, or bright gay pastels, you're sure to hit the mark when you use Keltex, the modern algin thickening agent.
With Keltex you make certain of exact printing paste viscosity and perfect penetration. Keltex assures clean-edged printing, brings out true, even color values. It gives equally effective results in machine or screen printing. Because it stops color migration it is used extensively in the pad pigment method of vat dyeing.
Keltex is economical and easy to use; requires only a light wash for complete removal. Super refined and processed to rigid standards, it is entirely free of grit or other foreign matter – gives precise and uniform results.
For full information on its adaptability to your particular requirements, write to our Technical Service Department.
KELTEX
REFINED ALGIN PRODUCT
KELTEX . . . A PRODUCT OF
KELCO COMPANY
20 N. Wacker Drive
CHICAGO—6
31 Nassau Street
NEW YORK—5
530 W. Sixth Street
LOS ANGELES—14
Cable Address: KELCOALGIN — New York

IF YOU WANT

DURABLE *Softness*

Paramine TA is the modern cationic finish for acetate, viscose, cotton and mixed fibres. Mills using paramine TA for dress goods, glove fabrics, tricot and other types of knitted materials have found this finish offers added sales appeal.

Thorough penetration of Paramine TA assures a softness within the yarn itself that gives materials a full hand and desirable drape—its substantive action produces a durable, lasting finish —Application is simple.

Use Paramine TA

*Reg. U. S. Pat. Off.

WRITE FOR DETAILS OR DEMONSTRATION

Arkansas Co. INC.

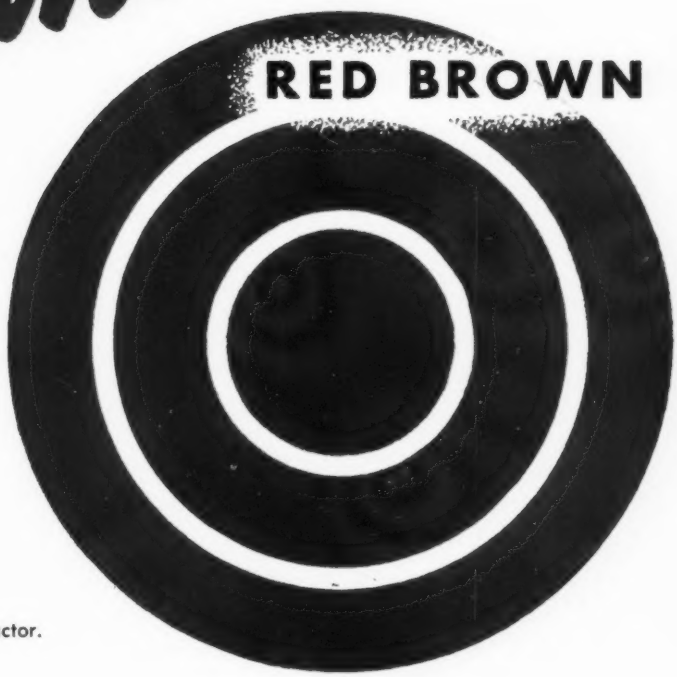
Manufacturers of Industrial Chemicals for Over 40 Years

NEWARK, NEW JERSEY

AMANTHRENE* VAT COLORS
provide the answer to the demand for
better color fastness in textiles

Amanthrene

RED BROWN



in double paste or
double powder form

An excellent base color for deep chocolate browns and a shading element for taupes and tans where fastness to light, washing, chlorine and perspiration is a factor.

Satisfactorily meets the requirements for slip cover materials, upholstery fabrics, sports wear, and men's work clothes.

Suitable for cotton and rayon yarn in warp, beam and package dyeing equipment, as well as for skein work and hosiery. Well adapted, also, to jig and pad-jig dyeing of piece goods.

Another of the Amanthrene range of superior vat colors. For detailed information on the whole range available, as well as data regarding your own particular requirements, consult our nearest branch. A.A.P. technicians are always happy to be of service.

AMERICAN ANILINE PRODUCTS, INC., 50 Union Square, New York, N. Y. • ***Plant:*** Lock Haven, Pa.
Branches: Boston, Mass. • Providence, R. I. • Philadelphia, Pa. • Charlotte, N. C. • Chicago, Ill. • Los Angeles, Cal.
Chattanooga, Tenn. • **Dominion Anilines & Chemicals Ltd.** • Toronto, Canada • Montreal, Canada

*Reg. U.S. Pat. Off.

ATLANTIC PETROLEUM CHEMICALS

ULTRAWETS

Can you expect ONE surface-active agent to do everything?

No, but there's a type of Atlantic Ultrawet for every job.

The detergency, wetting action, and high foaming of these alkyl aryl surface-active agents have been proved in scores of processes and products. They have increased efficiency, improved quality, and lowered cost in many textile, rubber, leather and other industrial processes, in making cleaners, cleaning compounds and cosmetics.

Some Ultrawets offer a higher concentration of active ingredients than others. They come in the form—liquid, beads or flakes—best suited to your particular requirements.

The check list below indicates the type of Ultrawet that will give you best results:

APPLICATIONS	ULTRAWETS					
	30E	**30DS**	**35K**	**SK**	**E**	**K**
Form:	Liquid	Liquid	Liquid	Bead	Flake	Flake
Minimum % Solids:	30	30	35			
Minimum % Active-Solids:	85	85	90	35	85	85
EMULSION BREAKING	✓					
LIGHT-DUTY HOUSEHOLD DETERGENTS				✓		
PENETRANT	✓	✓				
INDUSTRIAL DETERGENTS					✓	✓
HEAVY-DUTY HOUSEHOLD DETERGENTS						✓
EMULSIFIER					✓	✓
WETTING AGENT	✓	✓				
CHARGE STOCK FOR SPRAY AND DRUM DRYING			✓			
DRY MIXING WITH ALKALIS				✓	✓	✓
LIQUID HOUSEHOLD DETERGENTS		✓				
COUPLING AND SOLUBILIZING	✓					

For samples, further information and quotations, wire or write

THE ATLANTIC REFINING COMPANY

Chemical Products Division

260 South Broad Street, Philadelphia 1, Pa.
Chamber of Commerce Building, Pittsburgh 19, Pa.
Hospital Trust Building, Providence 1, R. I.
1112 S. Boulevard Street, Charlotte 3, N. C.
111 W. Washington Street, Chicago 2, Ill.

FOR YOUR INFORMATION

Woolen and worsted spinners adopt SYTON to lower production costs!

More and more mills are adopting Syton . . . confirming Monsanto's basic leadership in inventing and developing silica sols for spinning.

Syton's advantages stem from 10% to 30% increased yarn strength in woolens *and* worsteds!

FASTER PRODUCTION Because of increased yarn strength, the amount of twist can be reduced and production thereby speeded.

LOFTIER YARNS Less twist means loftier yarns, with tensile strength equal or better than the strength of untreated yarns of higher twist.

FINER YARNS WITH ALL GRADES Higher counts—closer to limit spin—for all grades of stock can be attained with Syton-treated yarns.

FEWER ENDS DOWN Reductions in ends down range from 25% to 50% depending on the grade of wool.

BETTER SPINNING EFFICIENCY Syton produces more uniform yarn with less beard and thin spots, reduced fly waste, and better drafting.

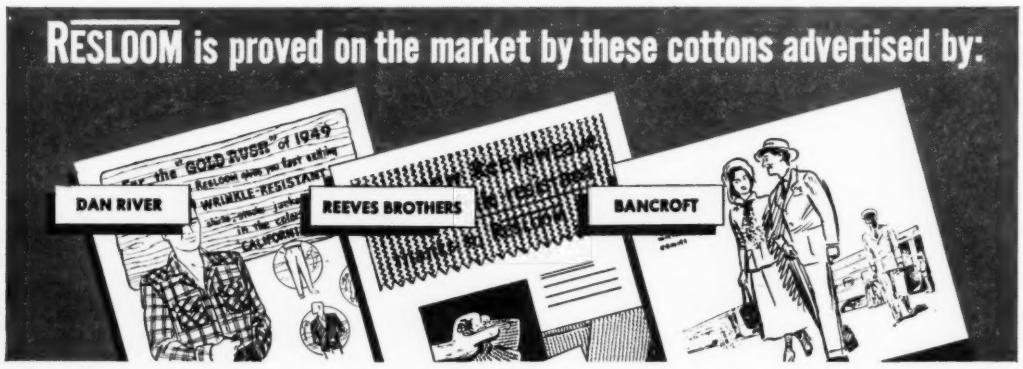
We have reports from many mills that confirm these advantages . . . a very practical reason why you should look into Syton now. For information and technical help, just check the handy coupon at 1.

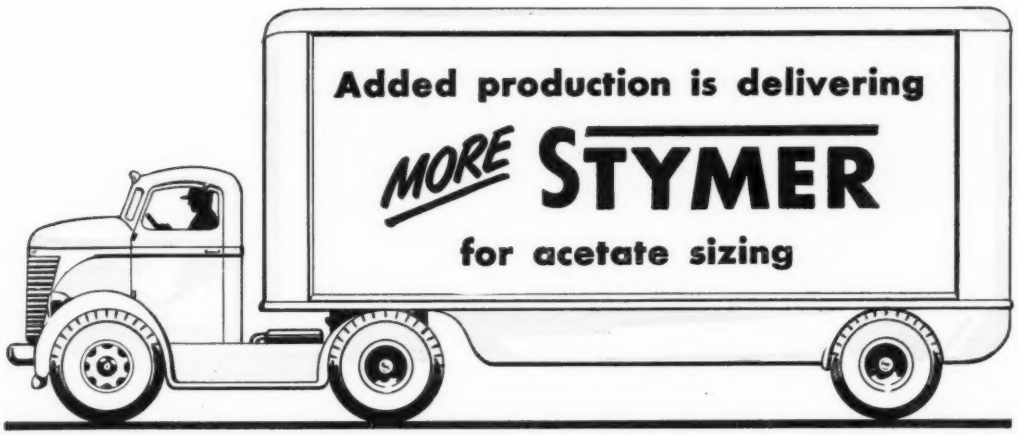
A retail success Important to MILLS
WRINKLE-RESISTANT cotton . . . with RESLOOM

Farsighted cotton men are taking a long look at the retail market where Resloom wrinkle-resistance is a new, extra sales feature that's moving goods faster. The conclusion is plain:

Wrinkle-resistance is a new sales plus for mills . . . as well as for their customers. And wrinkle-resistance becomes a sales *must* when the market changes and consumer resistance is up!

All the wrinkle-resistant cottons on the market today are achieved with Monsanto's Resloom. Doesn't that suggest the easiest way to give your fabrics this sales advantage? For information and technical help with Resloom just send the handy coupon checked at 2.





Just a few months after Stymer passed its first mill trials, demand outstripped supply. Mills tried it, liked it . . . and waited for it. We're thankful for their patience and glad to report substantial new production facilities. Now partly-filled orders will become fully-filled orders. And Stymer will be available to additional mill users desiring a fine, new sizing agent which gives outstanding practical results in slashing acetate warps.

What STYMER offers

1 **EASILY APPLIED** in a uniform coating on the individual yarn.

2 **ADHERES** well to the fiber.

3 **EASY TO SCOUR** from the woven fabric in warm water containing alkali and a detergent.

4 **REDUCES STATIC**

5 **FILM SHOWS** exceptional strength, abrasion resistance, smoothness and flexibility.

IN SLASHING, Stymer does not stick to uncovered dry cans, eliminates static electricity, separates easily at the lease rods and does not gel in the pipes or size box.

IN WEAVING, the Stymer-sized warps exhibit little or no shedding, maintain yarn twist, have fewer end breaks and produce a more uniform fabric. For information just send the handy coupon checked at 3.

Syton, Resloom, Stymer: Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS AND PLASTICS

MONSANTO CHEMICAL COMPANY, Textile Chemicals Department
Desk ADT 11, 140 Federal Street, Boston 10, Mass.

Please send me information on, ☐ 1. ☐ 2. ☐ 3.

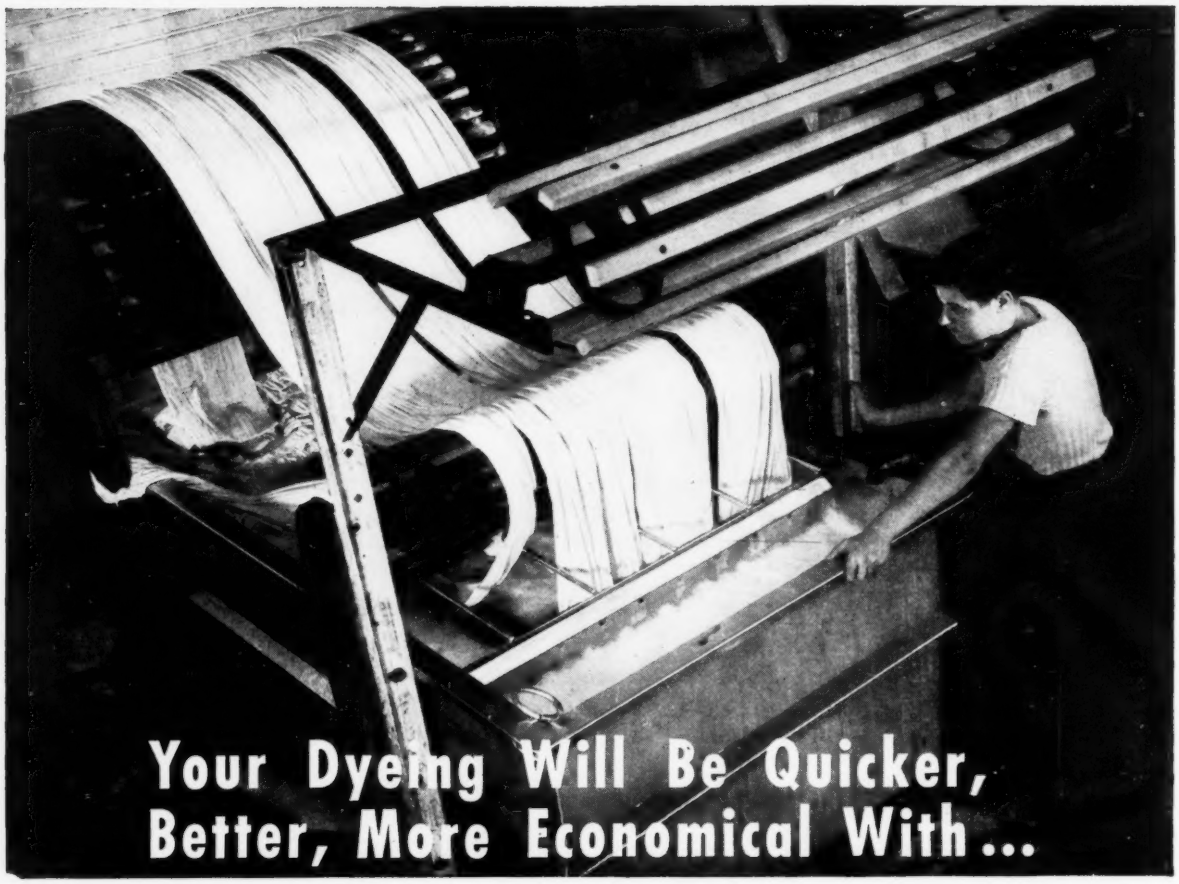
Name _____ Title _____

Firm _____

Address _____

City _____ State _____

SERVING INDUSTRY . . . WHICH SERVES MANKIND



A Feature to Remember!

ORATOL L-48 MAKES A GOOD BASE FOR DYEING

ORATOL L-48

The problem in dyeing is to secure maximum penetration, quickly . . . level results with the most delicate shades . . . with no waste time or added expense.

Oratol L-48 is a powerful detergent . . . with high foaming, emulsifying, and wetting properties . . . and quick-as-a-flash scouring action. As a dye-bath assistant, Oratol L-48 is stable in hard water and performs equally well on all types of fibres — under acid or alkaline conditions.

What this means to you:

1. Quick, thorough penetration
2. Greater assurance of level dyeing
3. Fewer redyes . . . fewer rejects
4. Greater output . . . greater profit

Oratol L-48 has other important advantages: It is not affected by metallic salts. It acts as a dispersing agent for lime soap deposits. It rinses rapidly, requires less water, improves fabric hand.

Ask our representative about economical Oratol L-48. Or write, today, for technical data and your generous free sample for testing.

Plants, Branches and Warehouses

Plants: Passaic, Carlstadt, N. J.; Los Angeles, Calif.

Warehouses: Providence, R. I.; Philadelphia, Pa.; Utica, N. Y.; Chicago, Ill.; Greenville, S. C.; Chattanooga, Knoxville, Tenn.

WOLF BRAND PRODUCTS

JACQUES WOLF & CO.

Chemicals PASSAIC, N. J.

8

uickly
waste

ılsify-
ction.
d per-
kaline

its
profit

ed by
posits.

write,
sting.

CO.

C, N. J.

ber 1, 1948

INDANTHRENES

famous for quality

Brilliant colors . . . fast to light, laundering, chlorine and wear.

No other class of dyestuffs has the brilliance of shade and the range of colors combined with the unsurpassed fastness properties of Indanthrenes.

GENERAL DYESTUFF CORPORATION

435 HUDSON STREET, NEW YORK 14, NEW YORK

BOSTON • PHILADELPHIA • CHARLOTTE • PROVIDENCE • CHICAGO • SAN FRANCISCO

Beauty in Black!

with

Hydroxanil*

the Superior Developer for Acetate, Nylon, and Union Materials!

HYDROXANIL is now available in quantity. It is an all purpose developer for dress goods, lingerie, hosiery, outerwear, knitted and woven piece goods. From coast to coast dyers are using Hydroxanil to solve their developing problems.

Be sure to get the original Hydroxanil developer manufactured only by us.

*Patent applied for

MARCO PRODUCTS

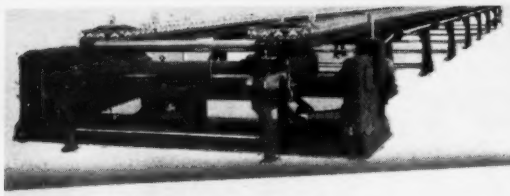
Write or wire for full particulars

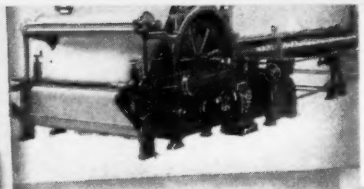
MAHER COLOR & CHEMICAL CO.

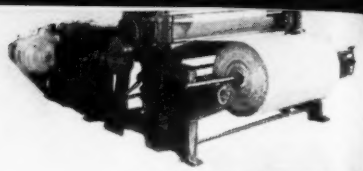
FACTORIES AND LABORATORIES

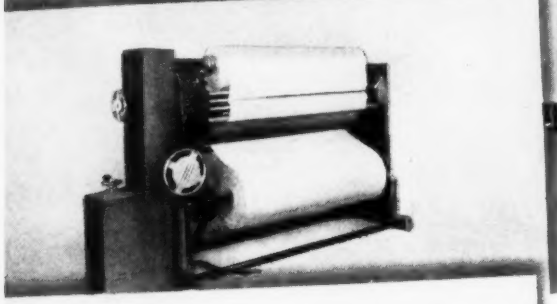
Home Office
355 West Ontario Street
Chicago 10, Ill.

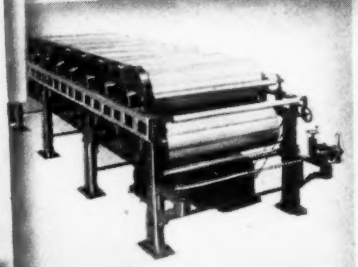
Branch Office
2327 East Eighth Street
Los Angeles 21, Calif.

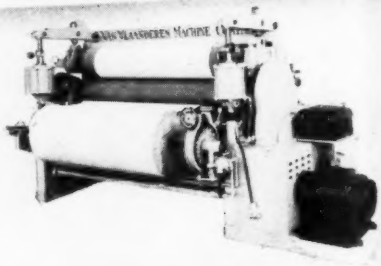


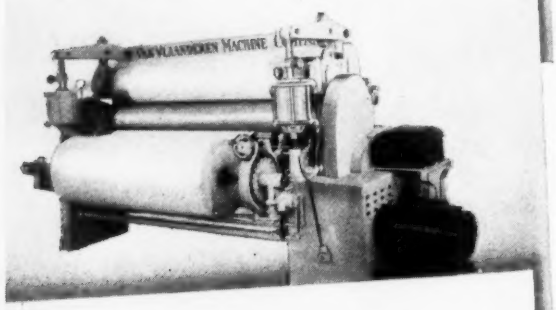








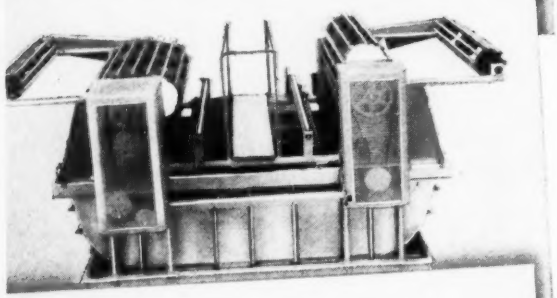


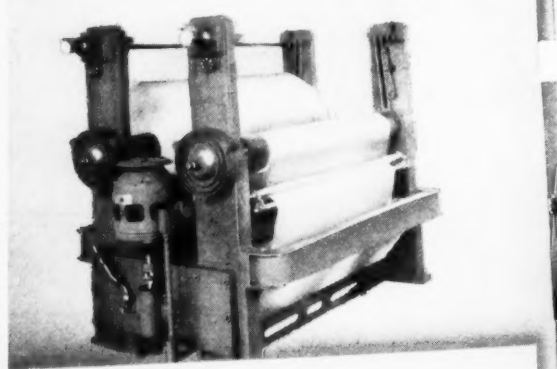


CHOSEN by the LEADERS

Wherever quality of finished goods is a prime consideration, Van Vlaanderen equipment has been preferred for nearly a half century. Many of America's most successful fabric processing companies have standardized on Van Vlaanderen machines.

Our engineers will be glad to consult with you whether you need a single machine or the design for an entire plant.

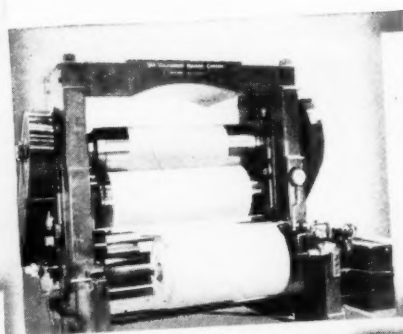


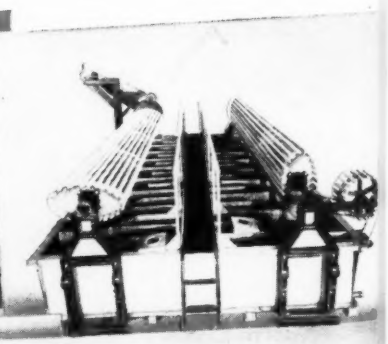


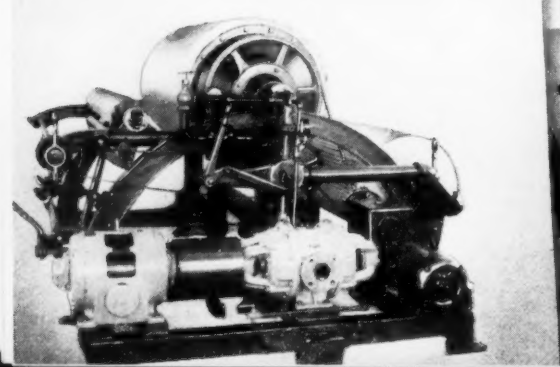
VAN VLAANDEREN MACHINE COMPANY

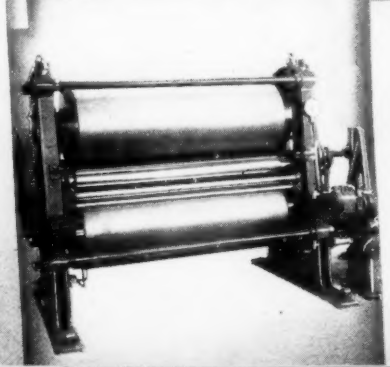
370 Straight Street, Paterson 3, New Jersey

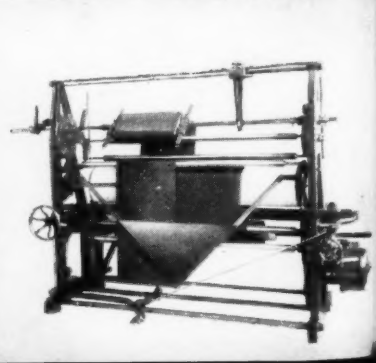
World's largest manufacturer of machines for processing modern fabrics

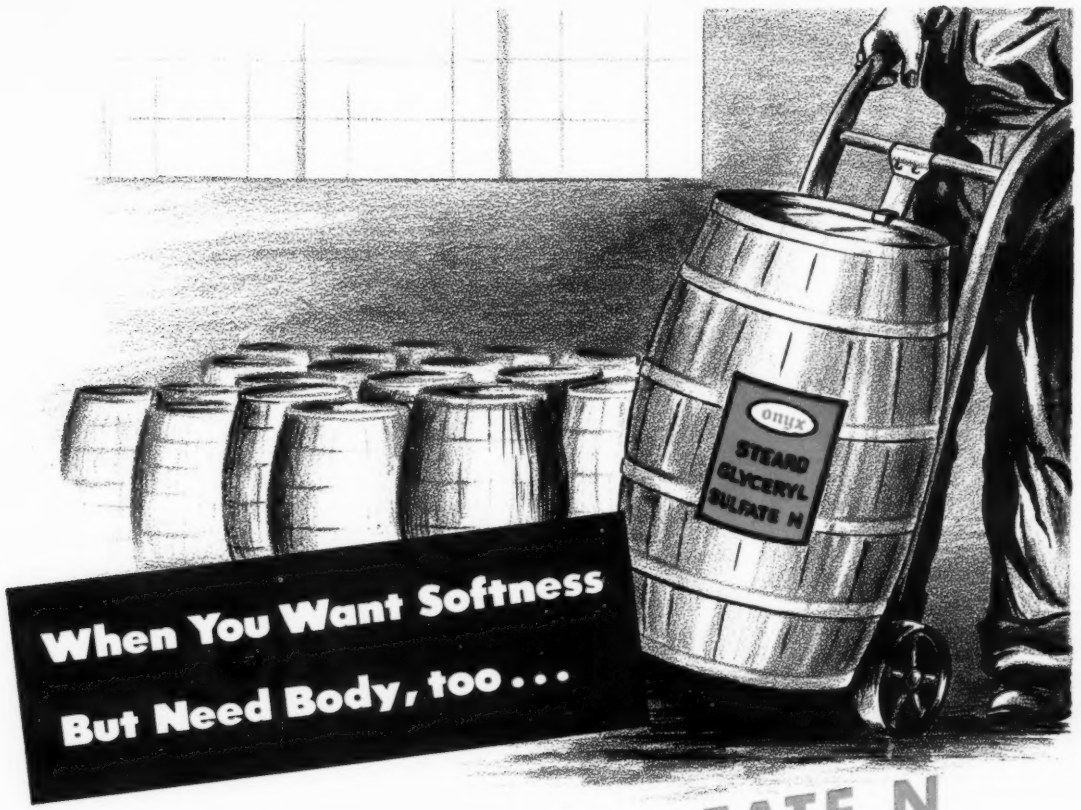












STEARO GLYCERYL SULFATE N

Should Come into the Picture

IT PROVIDES a smooth round hand, and because of its superior penetrating ability, it also tends to add body to the goods without excessive stiffening or thickening.

Its high SO_3 content not only makes Stearo Glyceryl Sulfate N more readily soluble and causes it to be more resistant to hard water and electrolytes, but makes it much more stable. Yellowing and rancidity are practically eliminated as potential troubles when you use this material.

Used in conjunction with other finishes, Stearo Glyceryl Sulfate N offers a considerable variety of hands, together with the moderate thickening and hardening effect which is one of its major functions.

It's economical, too, because less is required than ordinary finishes of this type. No changes are involved in the process or in equipment.

WRITE FOR ONYX TECHNICAL BULLETIN 12T

It covers the full story of Stearo Glyceryl Sulfate N and its uses.

onyx CHEMICALS FOR DYEING · FINISHING · PRINTING

ONYX OIL & CHEMICAL COMPANY

JERSEY CITY 2, N. J.

CHICAGO · PROVIDENCE · CHARLOTTE · ATLANTA

In Canada: Onyx Oil & Chemical Co., Ltd. Montreal, Toronto, St. Johns, Que.

For Export: Onyx International Jersey City 2, N. J.

Have you reserved ADVERTISING SPACE?

IN THE ANNUAL

PROCESSING REVIEW NUMBER

This important issue will be in the hands of nearly 8000 technicians in the TEXTILE WET-PROCESSING INDUSTRY on

DECEMBER 13th, 1948

ADVERTISING COPY MUST BE IN OUR HANDS

NOVEMBER 15th

The important feature of this issue is the listing of all new dyestuffs, chemical specialties and wet processing equipment which has been placed on the market since November 1947.

•

Any manufacturer of meritorious products used in the wet processing of textiles can obtain a free listing in this issue if the information is sent to our editorial department by

NOVEMBER 8th, 1948

AMERICAN DYESTUFF REPORTER **ONE MADISON AVE., NEW YORK (10), N. Y.**

SUMMER'S SOFT HARMONIES WILL ECHO NEW AND COLORFUL FASHIONS

Get the Needed Dyestuffs for All Popular Shades from Our Nearby Warehouse Stocks of

National Aniline Dyes

NATIONAL ANILINE DIVISION • **ALLIED CHEMICAL & DYE CORPORATION**

40 RECTOR STREET, NEW YORK 6, N.Y.

BOSTON • PROVIDENCE • PHILADELPHIA • CHICAGO • SAN FRANCISCO • PORTLAND, ORE. GREENSBORO • CHARLOTTE • ATLANTA • NEW ORLEANS • CHATTANOOGA • TORONTO

Quality? That's still UP!

Price? That's still DOWN!

And Du Pont "Avitone" gives you these important selling points:

- **Full softening effects**
- **Color and odor stability in storage**
- **Fabrics that sew better**

QUALITY—and economy, too—that's what you get when you use "Avitone," the superior softening agent for cottons or synthetics.

"Avitone" gives full softness and smoothness to fabrics . . . helps in sewing by lubricating the fibers so the needle slides through the fabric without breaking threads. (There's a plus cutters really go for.)

"Avitone" is stable to hard water, does not turn rancid or discolor on aging, is easy to use, and its wetting action aids in shrinking processes.

You can now save when you use Du Pont "Avitone" because, in contrast with so many products, the price of "Avitone" is the same as before the war.

Increased production makes "Avitone" immediately available to you. For further information, check with Fine Chemicals Div., E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware. Branch offices: Atlanta, Boston, Charlotte, Chicago, New York, Philadelphia, Providence, San Francisco.

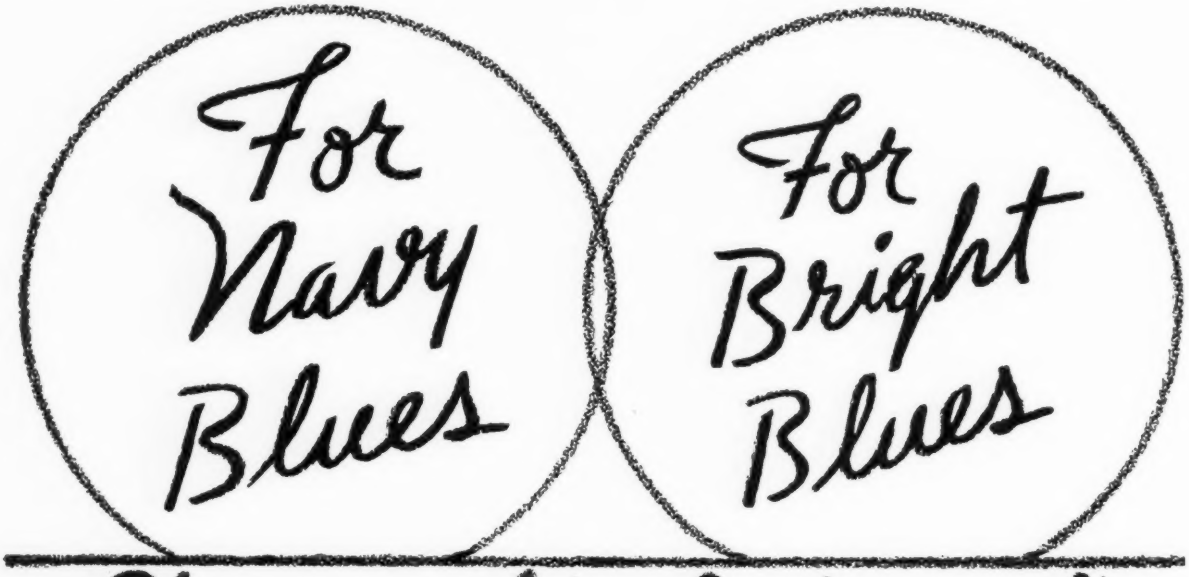
AVITONE *Fiber Softener*

TRADE MARK

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*



Pharmasols* Blue G Blue G B

THESE azoic colors, for printing cotton, linen or rayon, produce Navy Blue of good fastness at a low cost. In combination with the Pharmasol Yellows they produce deep Browns.

PHARMASOLS are stabilized solutions, adjusted to the most practical concentration, which can be easily applied with a maximum of efficiency.

PHARMASOLS do not decompose and thereby they overcome the otherwise problems of troublesome dissolving.

*Reg. U. S. Pat. Off.

Indigosol* BLUE IBC

THE outstanding soluble vat color for producing bright Blues in any depth, of excellent fastness, is Indigosol Blue IBC. It is suitable for dyeing, padding and printing on cotton, linen or rayon (excepting acetate fibers) where maximum fastness is required.

Indigosol Blue IBC is an important member of the group of very fast Indigosols, all of which are readily soluble and easily developed.

CARBIC COLOR AND CHEMICAL CO., INC.

451-453 Washington Street, New York City

BRANCHES:
PHILADELPHIA
PROVIDENCE HAMILTON, ONT.
CHARLOTTE, N. C.

IMPORTERS OF THE MANUFACTURES OF
DURAND & HUGUENIN S. A.
BASLE, SWITZERLAND

EXCLUSIVE DISTRIBUTORS OF
PHARMASOLS
PHARMOLS
PHARMACINES

Representative: Los Angeles (Hathaway Allied Products)

AMERICAN

DYESTUFF REPORTER

LOUIS A. OLNEY, D Sc
Directing Editor

NORMAN A. JOHNSON, B T C
Managing Editor

MYRON D. REESER
Advertising Manager

GRACE B. BURTON
Production Manager

M. H. MORGAN
Circulation Manager

Official Publication of the Proceedings of the American Association of Textile Chemists and Colorists

•

Published every other Monday by
HOWES PUBLISHING COMPANY, INC
One Madison Avenue New York 10, N Y.

LOUIS A. OLNEY
President

C. R. HOWES
Vice President

H. F. CRAWFORD
Treasurer

M. D. REESER
Secretary

C ESSENBREIS
Asst. Secretary

•

Also Publishers of
HOSIERY INDUSTRY WEEKLY
TEXTILE COLORIST
AND CONVERTER
HOSIERY MERCHANDISING

•

NOVEMBER 1, 1948
VOLUME 37 NUMBER 22

Contents

Contents of previous issues can be found by consulting the Industrial Arts Index and the Engineering Index, Inc. at your library

• Special Articles

An Outline of Qualitative Dye Analysis..... 709
Walter E. Mathewson

• Departments

Book Reviews 725

Abstracts 727

Trade Notes—New Products..... 737

• Proceedings of the American Association of Textile Chemists and Colorists

In Memoriam: Alfred P. Howes.....P730
Louis A. Olney

Resolution in Memory of Alfred P. Howes.....P731

Mohawk-Hudson Section P731

Shrinkage Control—A Sketch of the Imagination?.P733
Edwin Wilkinson

Meeting, New York Section.....P735

Fall Meeting, Mid-West Section.....P735

Meeting, WNE Section.....P735

Meeting, Philadelphia Section.....P736

Membership Applications P736

Employment Register P736

Calendar P736

Copyright, 1948, Howes Publishing Co., Inc.

ENZYME UNCOMMON

. . . New Rohm & Haas Desizing Agent pays extra dividend.

RHOZYME LA gives

✔ STABILITY AT HIGH TEMPERATURE =

✔ MAXIMUM DESIZING SPEED =

and in addition this important extra advantage

✔✔ THE ECONOMY OF A LIQUID ENZYME

Call or write us today for details. RHOZYME is a trade-mark, Reg. U. S. Pat. Off.

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Manufacturers of Chemicals including Plastics • Synthetic Insecticides • Fungicides • Enzymes • Detergents
Germicides • Chemicals for the Leather, Textile, Ceramic, Rubber, Paper, Petroleum and other Industries

AMERICAN
DYESTUFF REPORTER

VOLUME 37 NOVEMBER 1, 1948 NUMBER 22

An Outline of Qualitative Dye Analysis

WALTER E. MATHEWSON

THIS outline is to some extent a revision and development of analytical data published some years ago and represents an attempt to show properties of the common and important classified dyes in such form as to be easily applied for the rapid qualitative examination of solutions containing small quantities of the coloring matters as obtained from specimens of textiles and commodities. Dyes being widely used in commercial materials and products of various kinds, their full or partial identification is often of interest. Though such identification cannot take all possibilities into account because of the multiplicity of dyes manufactured, and the continual variation due to development of new tinctorial products, it may give all information needed from a practical standpoint. The description of dye solubilities and their analytical adaptations as given here are based on observations made with commercial products and must necessarily be tentative, since the behavior of dyes with immiscible solvents is affected by so many variables that much work must be done before such analytical characteristics can be described in full scientific detail—work that is desirable but not strictly necessary for the purposes of useful dye analysis. A few late literature references have been given.

In nearly all applications of coloring matters they are frequently used in admixture, textiles being dyed to mode colors and to matched shades with mixed dyes, or with single dyes applied successively; and foods, drugs and cosmetics are colored with mixtures to obtain the intermediate hues desired. Differential microscopical stains contain tinctorials that act selectively on unlike parts of tissues. Any rational plan for the identification of coloring matters in commercial products must take into account the possibility or likelihood that these will consist of dye mixtures. The steps taken in an analysis to separate such coloring matters as may be present furnish much information in regard to them, aiding in the further identification of the isolated dye substances.

A common method of approach, and one which is quite suitable when but a single dye is present involves the use of a series of independent tests applied to separate portions of the coloring matter or colored material, the desired identification being obtained by a "keying out" or elimination process. This is about the best that can be done when the dye substance is quite insoluble, or is dispersed on a textile or a lake pigment carrier from which it cannot be removed without decomposition. Generally speaking, such methods cannot be managed well with dye mixtures, and unless the unity of the coloring matter can be assumed, the results obtained must be interpreted with great care. Since the chemical examination of complex materials that are not in fluid form must perforce be of rather provisional nature, the first step of an analysis is to bring the coloring matter into solution. Extraction of soluble coloring substances from proteid material, lake substrata, and the like often is difficult, and the procedure to be followed must be adapted to the case in hand. Among the more commonly used extracting liquids are 2%-4% aqueous ammonia, alcohol, 60%-80% alcohol made slightly alkaline with ammonia, amyl or butyl alcohol containing a little concentrated hydrochloric acid, and pyridine. Madder lakes may be decomposed by boiling with 6-normal hydrochloric acid, (W. C. Bainbridge, *Jour. Assoc. Off. Agr. Chem.* 1942, *25*, 956). Concentrated sulfuric acid is a powerful dye solvent, but because of its reactivity, its use is subject to obvious limitations. n-Butylamine * has been found by the author to have advantages, however it is of somewhat higher cost than are most of the liquids mentioned. E. Clayton (Thorpe's *Dictionary of Applied Chemistry*, 4th edition, volume 4, p. 157) applies ethylene diamine as an effective extracting liquid for removal of direct and vat dyes from textiles.

A clear solution of the coloring matter having been obtained, it should be treated in some way to show that it contains but one coloring substance, or to separate components in case it contains a dye mixture. The method outlined here for the purpose is that depending on the use of immiscible solvents. After such separation as may be considered necessary has been carried out, the component coloring substances, in solution but in a condition of relative dye purity, can be further identified by property tests. The familiar reactions with acids, alkalies and reducing agents, for convenience have been quoted for the various dyes considered in the solubility divisions, these tests being simple, quickly made, and adaptable with some limitations also to dye dispersions in solid materials such as lakes

* n-Butylamine is a convenient and efficient medium for extracting vat dyes from textiles, the leuco compounds of most of these being quite soluble in the amine. For example, a six-inch square of the fabric may be treated with 20 ml. n-butylamine, then with 10 ml. of water in which has been dissolved 1-2 grams sodium hydrosulfite. After standing for a few minutes the leuco dye solution is pressed out, poured in a small separator, diluted with 20 ml. amyl alcohol and washed with several 75-100 ml. portions of water to remove the inorganic salts. The leuco compound in the solvent quickly becomes oxidized to the dye proper and on standing nearly all of the latter collects at the interface of the liquids where it may be drawn off together with a few ml. of solvent and the latter then allowed to evaporate to give the solid dye. The solution of the leuco compound in the amine-alcohol mixture also can be applied for color reactions, and in case of mixtures offers some possibilities for separations.

and textiles. Oxidation reactions with bromine, and with vanadyl sulfate, are described also.

Solvents

As liquids for immiscible solvent separations, iso-amyl alcohol, ethyl ether, and so-called petroleum ether have in common the advantage that they are readily obtainable, and at moderate cost. Normal amyl alcohol, and the butyl alcohols, normal and iso, behave very much like iso-amyl alcohol as selective solvents, and might be used instead of it for dye extractions; however, the butyl alcohols show greater reciprocal solubility with aqueous liquids, and for this reason are less suitable than are the amyl alcohols.

Ordinarily, the C. P. grades of these reagents are satisfactory, but in dealing with dyes containing reactive amino groups, purified solvents may be necessary.

Iso-amyl alcohol, which here will be designated merely as "amyl alcohol", may be freed from some troublesome impurities by treating it with reactive amino or hydrazino compounds. For example, a good grade of the C. P. alcohol may be mixed with 0.8% of its weight of dinitrophenylhydrazine, and 0.2% concentrated sulfuric acid, heated to boiling, then removed from the heat source and allowed to stand for a day or so. The liquid is decanted from the small amount of separated solid material, and carefully distilled, the first and last small fractions being rejected. The purified solvent thus obtained, which must be quite free from any entrained yellow dinitrophenylhydrazine, may be tested for aldehydes, etc., as described by Crocker (*Merck's Index*, 5th Edition, p. 676). A 10 ml. test portion, when warmed with 0.02-0.03 g. phloroglucinol until the latter has dissolved, cooled, and mixed with an equal volume of concentrated hydrochloric acid should give only a very faint pinkish coloration.

Commercial "C. P." petroleum ether, of specific gravity 0.65 may be further purified by shaking out with one or more portions of concentrated sulfuric acid containing some benzeneazo-b-naphthylamine or Yellow AB, then with a little of the pure acid. Finally, the colorless solvent may be poured into a separatory funnel and any trace of dissolved acid removed by washing with a little water. (*Jour. Ind. Eng. Chem. 12*, 883). The solvent thus purified is suitable for use without final redistillation. The chief components of commercial petroleum ether are now obtainable in pure form, and as reagents offer the advantages of more definitely defined properties. In admixture with amyl alcohol as usually employed in dye examinations the relatively slight differences in the solvent action of the different pentanes and hexanes are quite insignificant; when a straight hydrocarbon liquid is employed, as in separations of oil soluble dyes, the advantage of employing a single substance perhaps is greater.

Aniline, mixed with an equal volume of amyl alcohol, may be used for the extraction of the direct dyes, and for the separation of some of the more highly sulfonated coloring matters. The pure base also can be applied for the latter purpose. The dyes dissolved in the aniline solvents may be removed by diluting the latter with carbon tetrachloride or ether and washing with water, however since even a trace of dissolved aniline will interfere with some of the confirmatory dye tests, it must be carefully removed from the neutralized aqueous dye washings by repeated extraction with the solvent employed for dilution, before such tests are applied. This troublesome step is avoided by the use of amyl alcohol mixtures containing n-butylamine instead of aniline, the aliphatic amine being readily volatile, and having no tendency to form colored reaction products through the action of oxidizing or diazotizing reagents. n-Butylamine, though completely miscible with water, is so to speak, much more soluble in amyl alcohol. A solution containing 10 ml. butylamine and 30 ml. water, when shaken at room temperature with 20 ml. amyl alcohol gives up 85%-90% of the base to the organic solvent layer. The butylamine mixture is not quite as effective as a dye solvent as is the aniline-alcohol.

In respect to the non-organic solvents employed, it may be said that neutral aqueous liquids such as salt solutions cannot change the dyes chemically, and may be employed with advantage with the more soluble coloring matters. The low solubility of the sodium and other metallic salts of the color acids in organic solvents restricts the use of aqueous inorganic salt solutions in immiscible solvent combinations, and furthermore, dyes dissolved in such liquids are less readily isolated than from completely volatile media. Solutions of the fixed alkalies have the disadvantage last mentioned, however are quite useful, especially with many difficultly soluble phenolic dyes which give phenolates of high water solubility. The stronger alkaline solutions such as normal potassium hydroxide do not form obstinate emulsions as readily as do weaker ones.

The aqueous liquids of greatest applicability in this scheme are those of pH. 7 to -0.6, especially dilute hydrochloric acid of concentrations 64th-normal to 4-normal. Solutions of most dyes (or their color acids), in dilute hydrochloric acid can be evaporated to dryness to expel the solvent, without destruction of a large proportion of the coloring matter, and 4-normal hydrochloric acid has not been observed under the condition of the tests to cause any perceptible esterification of color acids with amyl alcohol or other alcoholic solvents used. Dyes containing unsubstituted amino groups may condense under the influence of acid with reactive aldehydes, etc., present in the colored materials or as impurities in the organic solvents, so that some such coloring matters show alteration of properties, especially those characteristics which are directly dependent on the amino group. It is seldom advantageous to use acid above 4-normal or below 64th-normal in strength, and the very low acid concentrations of course are sensitive to buffering effects from correspondingly small amounts of alkali derived from glass vessels, etc.

Separation of Dyes by Fractionation

The method of dye analysis by use of immiscible solvents * involves only a simple extraction when large solubility differences exist. With the smaller differences that more often occur, a single shake-out operation gives insufficient separation, and a fractionation procedure that may be considered an application of the principle of counter currents must be used. The qualitative analysis of a mixture of two dyes not differing greatly in relative solubility in the solvents employed thus may be by an adaptation of the quantitative method, which may be described as follows:

A pair of solvents is selected for which the distribution ratios or partition coefficients of the respective coloring matters show a considerable difference. The relative amounts of these solvents taken for each single extraction must be in such relation that in the shake-out operation most of one dye will go to the upper layer, most of the other to the lower layer. The dye mixture dissolved in a portion of the heavier solvent, is shaken out successively in several separatory funnels (usually two to four) which are provided with portions of the lighter liquid; and these light solvent portions are then washed by shaking with several portions of the heavier liquid, each of the latter being passed through the series of funnels in the same order, and shaken out in the same way as was the original solution. By these operations one of the dyes will be brought more or less completely into the heavier liquid, the other into the lighter one. The fractionation may, of course, be begun with the dye mixture dissolved in the first portion of the lighter solvent.

When the partition coefficients or distribution ratios of the two dyes are known, and remain practically constant within the ranges of concentration occurring in the separation, the effectiveness of the latter to be expected with a given number of funnels and washings may readily be calculated. Such calculated efficiencies can be at best only approximate since the distribution ratios of dyes, like those of most other solutes, vary

* Methods of dye separation by immiscible solvents are given by A. G. Woodman, *Food Analysis*, 4th Edition, New York, 1941; L. Koch, *Jour. Assoc. Off. Chem.* 1943, *26*, 245-9.

considerably with their concentrations. The associated molecules that are present in larger proportions in the more concentrated aqueous solutions of dyes seem to be relatively insoluble in organic solvents, especially ether. When the total concentration in an aqueous-organic pair of solvents is lowered, the distribution usually changes so as to show increased relative concentration in the organic solvent.

If the fractionation procedure as described must be developed and guided entirely by calculated values, as when applied to the analysis of colorless substances, it is usually quite impractical; with dyes, however, the progress of the separation is more or less apparent at all stages, so that necessary modifications of procedure are indicated, and often can be made with no additional manipulation. The specific methods quoted below from early work by the author illustrate the application of the fractionation procedure to quantitative dye separation. In the first two examples given, comparatively high dye concentrations were taken so that the coloring matters might be estimated with accuracy by titration. It is often necessary to use smaller amounts of dyes, and the latter may then be determined conveniently by spectrophotometry, as was done in the work with the closely similar dyes Yellow AB and Yellow OB which is quoted as the third example.

Separation of Naphthol Yellow S, Orange I, and Indigo Carmine.

(*Jour. Ind. Eng. Chem.* 1913, *5*, 5).

Thirty cc. of solution containing 0.1000 gram orange, 0.1000 gram blue, and 0.1083 gram yellow was treated with 2 cc. five-normal hydrochloric acid and shaken through three funnels containing each 60 cc. amyl alcohol. The latter was then washed with two portions of dilute hydrochloric acid (2 cc. five-normal hydrochloric acid + 28 cc. water, or one-third normal). The second and third funnels were then washed with a third portion of acid (30 cc.) and the third funnel with a fourth portion. The blue was determined directly in the extracted solutions and washings.

The amyl alcohol was then washed with four portions of 120 cc. each sodium chloride solution (200 grams per liter). The second and third funnels were washed a fifth time and the third a sixth time.

Blue, found 0.099 gram = 99 per cent.

Orange, found 0.0985 gram = 98.5 per cent.

Total color was determined and yellow estimated by difference.

Yellow, found 0.1080 gram = 99.5 per cent.

Determination of Orange II in Orange I.

(U. S. Dept. Agr., *Bur. Chem. Circ.* No. 113, p. 4.)

The dye solution (about 50 cc.) was treated with 10 cc. concentrated hydrochloric acid and shaken with 50 cc. amyl alcohol. Practically all the dye went into the alcohol, and the lower layer was drawn off and discarded. The amyl alcohol was then washed with six 50 cc. portions of normal or 5 per cent sodium carbonate, these being passed successively through a second and third funnel each containing 50 cc. of amyl alcohol. The last two funnels were given two additional washings. Gasoline was then added, and the color removed and determined in the usual way.

The result given in the fourth line was obtained by the same procedure, except that a third funnel was not used.

Total dye taken, grams.	*Orange II taken, %*	*Orange II recovered, %*
0.1605	0.0	0.3
0.1708	5.7	6.0
0.2095	23.4	22.6
0.1708	5.7	5.5

The equilibrium between the concentrations of the Orange I in the two layers is not very quickly established, and the mixtures must be well shaken, then given some time to separate. The liquids can be very quickly separated with a centrifuge. (Note. The term "gasoline" was used in the preceding and in the following outline to refer to petroleum ether, specific gravity 0.65.)

Basis of approximate separation of Yellow AB and Yellow OB, showing behavior of the respective dyes when fractionated between light gasoline (petroleum ether, sp. gr. 0.65) and 13-normal sulfuric acid.

(*Jour. Ind. Engr. Chem.* 1920, *12*, 883.)

A solution of 0.00400 g. dye in 40 cc. of gasoline was washed or shaken out with four 20 cc. portions of the dilute acid. Two additional separatory funnels containing 40 cc. portions of gasoline were provided and each acid washing portion, after being drawn out of the first separatory funnel, was shaken out successively in the second and third funnels. A fifth additional 20 cc. portion of acid was shaken in the second and third funnels and finally a sixth portion in the third. The gasoline was driven off on the steam bath, care being taken to avoid volatilization of the dye, and the residue dissolved in 93 per cent alcohol. The alcoholic solution was diluted to exactly 100 cc. (or to 25 cc. when it was not strongly colored), the light absorption constant at 0.436 mμ determined and the amount of dye calculated, using the figures for extinction coefficients given in the latter part of this paper. The acid portions or washings were combined, diluted with an equal volume of water, the dye extracted by shaking with two portions of gasoline, and the gasoline solution thus obtained treated in the same manner as the one first described.

As has been stated the peculiar suitability of the immiscible solvent fractionation for the analysis of dye mixtures is dependent largely on the circumstance that the separation can be followed visually. It must be remembered that with higher dye concentrations such as are illustrated by the first two examples given, the final solutions in which the respective dyes will be present in 95% to 99% dye purity may still contain, in each case, sufficient of the other coloring matter to show considerable modification of hue. With dilute solutions such admixture will be of less obvious. This may be illustrated by the case of a mixture made from 50 parts of a yellow dye and one part of a blue or purple dye of similar tinctorial strength. A dilute solution of such a mixture will show a fairly clear yellow hue, but concentrated solutions will be red, green or black.

A limited number of so-called straight dyes contain more than one chemical component in considerable proportion, and perhaps are better viewed as the products of certain designated manufacturing processes than as impure chemical individuals. These products will behave as mixtures in the solvent fractionations as they would, of course, in any other methods of separation that might be devised. As the principal component substances usually are closely similar in hue, but more or less dissimilar in relative solubility, the fractionation is less simple, and its course is less easily followed by the eye. With mixtures containing such dyes, systematic shaking out processes require more judgment but nevertheless are practicable for qualitative purposes. For quantitative estimations definite data—usually unavailable—in regard to the composition of the dye products would be needed, and spectrophotometric measurement is then an especially useful auxiliary. The examples just given of quantitative fractionations are those of food colors, these products being manufactured by processes that remove the so-called subsidiary dyes to a greater degree than is necessary with textile coloring matters.

Although quantitative methods furnish a groundwork for qualitative procedures, they presuppose a knowledge of the composition of the material under test, and in practice follow, rather than precede, the qualitative examination. With simple dye mixtures containing essentially but two or three colored chemical individuals, it usually is not difficult to formulate a fractionation plan suitable for the quantitative separation of the coloring matters after the identities of these, or at least their solubility properties, have been disclosed by qualitative examination. This last named step is less easily made to conform to system.

It is the special merit of the fractionation procedure that it provides, at least better than any other, for the separation of the large number of dye mixtures that may be encountered, including those of coloring

matters for which reference data are not at hand. It aids also for the differentiation and identification of individual dye substances, not only for commercial tinctorial products but also for colored compounds derived by known reactions from colorless substances and thus may assist in the characterization of the latter. The dyes to which the immiscible solvent separations can be most easily adapted are those which dissolve freely in a considerable number of the available solvents. Such dyes, especially the acid phenolic colors, though perhaps not making up the majority of the commercially important soluble tinctorial substances, are the ones most commonly used for coloring miscellaneous technical products.

The examination of a sample for coloring material usually involves the characterization of not more than two or three principal dye substances. Production of dark and broken tones is accomplished very often through the use of mixtures of two or three straight dyes, this permitting an exact adjustment to a reference hue. Very complex mixtures are not commonly met, except perhaps as they might be formed unavoidably by extraction of a heterogeneous material such as a textile colored in a varigated small pattern.

Solubility data as observed with specimens of commercial dyes have been summarized in the tables, the individuals for convenience being arranged in ten arbitrarily chosen groups. A classification by relative solubilities of the large number of dyes of commercial interest can show no sharply defined group boundaries; any given coloring matter will be but slightly different from certain others. Any grouping is conventional, and at best can hold only in a general way because of the individual variations of the partition coefficients with concentration, temperature, etc. Two trends are observed depending on the predominance of one or other of the ubiquitous auxochromic hydroxyl and amino radicals. In general, the hydroxy or phenolic type dyes are the more completely extracted by organic immiscible solvents from aqueous liquids as the acidity or H-ion concentration of the mixture is increased; the reverse is true when the amine properties predominate. Introduction of the sulfonate radical into a dye molecule always tends to increase the relative solubility in the aqueous solvents. With the benzidine and similar cotton dyes, the amino and sulphonic acid groups together permit the formation in acid media of quite insoluble inner salts, and the choice of solvents for fractionation is then restricted to nearly neutral or alkaline liquids.

Qualitative Examination

This usually involves solution of the tinctorial matter and a shake-out treatment that will distribute it in several fractions, when any non-homogeneity is likely to be disclosed. For the initial solution, commercial dyestuffs need merely to be dissolved in water, concentrations of 0.1% to 0.01% being usually most suitable. Acid dyes may be stripped from wool in most cases by soaking with hot dilute ammonia water, or with ammoniacal dilute alcohol. The alcohol if present is then boiled off, after which attempt is made to extract the coloring matters from the liquid by acidifying it with half its volume of concentrated hydrochloric acid and shaking out with amyl alcohol. From lakes and substrata, dyes often may be removed by shaking the material with strongly acid amyl alcohol. The coloring matter in the organic solvent can then be taken out ordinarily by diluting with petroleum ether, and shaking out with water, etc., this giving a fractionation similar to that discussed for "solution B", this page. Dilute alkali should not be used for the washing until such dyes as can be taken out by water have been removed, for the water washings are relatively free from objectionable resinous and proteid contaminating substances. With dye products the solutions as made directly require no preliminary steps before the shake-out treatments.

After the coloring matter has been obtained in a solution fairly free from impurities, a few tests made with small portions of the liquid generally will show absence of whole dye groups.

Solvents may be applied for the systematic qualitative analysis of an unknown solution somewhat as shown below, this outline being based on the tabulated solubility data.

The dye solution is treated with an equal volume of 1:1 amyl alcohol-petroleum ether mixture, and with ½ volume concentrated hydrochloric acid, and well shaken. If a precipitate is formed, the mixture is filtered with suction through an asbestos pad on a Gooch crucible or small perforated plate, and the precipitate washed with a few milliliters of water, the washings being received in the filtrate. The precipitate of color acids is moistened on the filter with a few drops of normal potassium hydroxide solution, then dissolved in a little water which is drawn into a clean receiving flask.

The solvent mixture from which the dyes forming insoluble color acids have been filtered, is poured into a separatory funnel, allowed to settle, and the lower layer drawn into a second separator containing a small amount of the 1:1 amyl alcohol-petroleum ether mixture. The solvent portions in the funnels are washed with a small portion of 4-normal hydrochloric acid, which is shaken successively in the first and second funnels. As the case may require, this fractionation may not be necessary or may be advantageously supplemented by use of another funnel and additional portions of the solvents. By this procedure the acid coloring matters will be more or less completely separated into:

(a) Dyes forming very insoluble color acids. (This includes most of the common direct cotton dyes).

(b) Soluble dyes extracted in relatively large proportion from 4-normal hydrochloric acid by 1:1 amyl alcohol-petroleum ether mixture. (Includes most of the simpler sulfonated acid dyes of low sulfur percentage).

(c) Soluble dyes not extracted in relatively large amount from the 4-normal acid by the organic solvent mixture just mentioned. (Includes most of the simpler higher sulphonated acid dyes).

If basic dyes are present, they will in general, appear in the fractions described under (b) or (c), and small portions of these solutions may be tested by Rota's procedure, being made strongly alkaline with potassium hydroxide, shaken with ether, the latter separated and finally treated with excess of acetic acid. If basic dyes are found they may be separated from acid coloring matters by applying the same procedure to the main part of the solution under examination. However, this alkaline treatment is likely to lead to some alteration and destruction of the color bases, so that it is safer, when practicable, to use an acid-solvent fractionation for their further separation, applying differences indicated by the reference solubility tables. Basic dyes are much less numerous, and less frequently employed than acid coloring matters: furthermore they are not very commonly used in admixture with acid dyes.

The solution containing excess of potassium hydroxide, of the dyes indicated under (a) may be acidified slightly and shaken out (perhaps fractionated), with 1:2 butylamine-amyl alcohol mixture as the first step in its treatment. The marked colloidal character of the solutions of most of these coloring substances, the close similarity of the numerous members of the group, and especially, the lack of any large variety of solvents suitable for their fractionation, makes their separation difficult.

The 1:1 petroleum ether-amyl alcohol mixture containing the dyes described under (b) may now be further fractionated by shaking out either with small portions of dilute hydrochloric acid of decreasing strengths, or with water, the washings being kept separately in test tubes or small beakers. The organic solvent as first obtained after the shaking with the original strongly acid solution retains a considerable amount of dissolved hydrochloric acid, and if it is washed with several portions of water the acid will appear in rapidly decreasing amounts in the successive washings; the dyes less readily held in the solvent by the acidity will predominate in the first wash portions, those held up at lower acidities will appear later. It is advisable sometimes to add more petroleum ether to decrease the solubilities of the dyes in the organic solvent layer and hasten the washing-out process. Dilute alkali should not be used as a wash liquid until dyes that can be taken out with water have been removed.

The various fractions obtained may be

tested directly, or some or all of them may be combined, acidified further, shaken with a portion of amyl alcohol to collect and concentrate the dye material, the amyl alcohol solution finally being diluted with an equal volume of petroleum ether and again fractionated with water or dilute acid as before. If the appearance of the fractions indicates but one coloring matter to be present, this latter may be obtained in more concentrated solution if desired, by acidifying, shaking with amyl alcohol, separating the alcohol extract, diluting it with one or two volumes of petroleum ether, and finally shaking out with one or two small portions of water.

Although a difference in hue of the different wash fractions indicates the resolution of a mixture it may be due merely to differences in acidity. Such effect will be apparent when small comparison portions are neutralized or brought to like acidity, conveniently by addition of sodium acid carbonate.

The acid aqueous solution of the dyes mentioned under (c) obtained by the treatment with hydrochloric acid, 1:1 solvent, and filtration, may be shaken out with one or more portions of amyl alcohol to take up dyes extracted by the straight alcohol but not by the mixed solvent. The combined amyl alcohol extracts are then fractionated by washing with small portions of dilute acid or water as was described for solution (b). The dyes of group 4 and some of those of groups 2 and 3, remain in chief part in the aqueous liquid after the extraction with amyl alcohol at high (4-normal) acidity. Dyes of groups 2 and 3 when present are extracted by shaking out with amyl alcohol after the liquid has been carefully neutralized with sodium or potassium hydroxide, then made faintly acid again with hydrochloric acid.

The dyes of the heterogeneous group 4 remain in the aqueous liquid. Almost all of the dyes of the group are removed in large proportion from 1/32-normal acid solutions by shaking with 1:1 aniline-amyl alcohol mixture (the acid of course, forms the equivalent amount of aniline hydrochloride. For use of the much preferable butylamine mixture see solubility data for group 4.

The use of neutral normal (6%) sodium chloride solution and amyl alcohol is quite convenient for preliminary separations of unknown dye mixtures when no precipitation occurs. Dyes of groups 1, 2, 3, 7, most of those of group 6 and some of those of group 8 are taken up by the organic solvent. Dyes of groups 4, 9, and 10 are not taken up. The few dyes which are readily destroyed by hydrochloric acid of moderate concentration, for example, Auramine and Naphthol Green B, must when present be separated by some method not involving the use of strong acid. Solvents suitable for their extraction are indicated by the solubility data. Addition of hydrochloric acid to the solutions of most green, blue and purple triphenylmethane dyes changes their hues to pale tones of yellow or brown, this however corresponding merely to the reversible so-called indicator change shown by most coloring matters with varying hydrogen ion concentration. Yellow nitro dyes (containing no other chromophoric groups) also become paler reversibly with strong acids.

With many commercial products, direct and basic dyes are known to be absent, or can conveniently shown to be so by a few preliminary tests, and in such cases extraction may be begun with amyl alcohol from strongly acid solution, such procedure giving the minimum difficulty from emulsification, and good removal of dye. The amyl alcohol solution can be diluted with petroleum ether at any stage for adaptation to the group data.

With mixtures of unknown dyes the most suitable acidity for an immiscible solvent separation sometimes may be indicated by the changes in hue shown by the solution on the gradual addition of acid or alkali. The analysis of a commercial acid-alkali indicator solution is described below as an example. This indicator solution gave a red coloration when added to aqueous liquids having a pH of 4 or less. With increasing alkalinity the hue passed successively through orange, yellow and blue, finally becoming purple in the neighborhood of pH 11-12.

Three ml. of the commercial solution was diluted with about 40 ml. of approximately 4-normal hydrochloric acid, and shaken in a separatory funnel with 40 ml. of ether. The lower bright red layer was drawn off, and the ether again shaken with 10 ml. of 4-normal acid, this being then drawn off into the main extracted portion. This acid aqueous liquid was found to contain practically all of the red—yellow dye giving the red coloration at high acidities. After adding just sufficient sodium hydroxide solution to neutralize the acid, and adjusting the pH so that the hue was orange-yellow, the dye was almost completely extracted by a single shaking out with ether.

The brownish ether solution from the original acid extraction was shaken with 25 ml. of approximately 1/20-normal caustic soda which removed all dye, forming a deep purple aqueous solution. The latter was drawn off and carefully treated with very dilute hydrochloric acid, until it had just assumed a bluish green hue, then shaken out with 40 ml. ether. The lower greenish layer, which contained a dye blue in alkaline solution was drawn off, and the ether again shaken with very dilute caustic soda. Without drawing this off it was treated with acid until just bluish green, and again shaken with the upper ether layer. The liquids were now separated and the upper layer, which was colorless but contained a dye red in alkaline solution, was reserved and handled as described further below. The lower layer was added to the similar solution obtained by the first treatment, and the combined liquid acidified with somewhat more hydrochloric acid than required to change its hue to brownish-yellow. From this solution one shaking with ether removed nearly all dye. This coloring matter was blue in alkaline, pale brown in acid solutions, and was identified as bromothymol blue, dibromothymolsulfonphthalein.

The ether solution containing the red-colorless dye was shaken with very dilute sodium hydroxide, nearly all of the dye passing into the aqueous layer. It formed a deep red solution free from the tint of the blue dye, and was identified by subsequent tests as phenolphthalein.

The red-yellow dye obtained in the first acid extraction was closely similar to, but not identical with, dimethylaminoazobenzene. A very considerable number of aminoazo derivatives more or less similar in properties to this substance have been proposed at different times as acidimetric indicators. The dye was extracted by ether in large proportion from solutions of such pH as to be orange-yellow; with higher or lower pH, less was extracted. The dry substance dissolved in concentrated sulfuric acid with formation of a yellow solution.

The qualitative separation as just described was almost quantitative. However, a regular fractionation procedure would be preferable for quantitative results.

Identification of Separated Dyes

The descriptions of common properties which follow, may give sufficient information for the provisional identification of the coloring matters obtained by the solvent treatment; or further tests as described in the literature may be made.* The relative solubility observed with certain pairs of solvents often is useful, and can be found with dye obtained by evaporating some of the fractionated solution to remove excess of hydrochloric acid and dissolved solvent. Some closely related dyes can be distinguished quite simply, and with minimal material by comparing their hues in solvents of controlled pH. Thus the acid alizarine blues, #1075 and #1088, both give blue aqueous solutions, reddened by addition of hydrochloride acid, but at normal acid normality, the solution of #1075 is red-violet, while that of #1088 is violet-blue.

Because of the nature of the fractionation process, the predominant amount of a dye will collect in the fractions corresponding to its group, but sharp demarcations are not observed. Hence in identifying a dye obtained by fractionation, reference should be made to the descriptions of dyes of the observed hue, not only of the group suspected, but of similar groups.

The bromine oxidation test is described

* A very comprehensive method of dye identification and analysis has been given by E. Clayton in Thorpe's *Dictionary of Applied Chemistry*, 4th Edition, Vol. 4, pp. 147-175. For identification of small amounts of beta-naphthol dyes by systematic reduction methods see L. Koch, R. F. Mulligan and S. Zuckerman, *Ind. & Eng. Chem.*, *16*, 755; *17*, 569.

in some detail in following paragraphs, and may be used in connection with the table which gives the constitution of the component intermediates of the listed dyes. The oxidation test with vanadyl sulfate also is described. Hue changes of the dye solutions with sodium hydrosulfite are as observed under the conditions stated. The table showing color reactions with hydrochloric acid and with sodium hydroxide, like the others applies with solutions of concentration range 0.1 to 0.002 grams per 100 ml. The more concentrated solutions of most green, blue and violet dyes show some dichroism, and those of the oranges and yellows appear redder with increasing concentrations. As it is not possible to describe hues observed in the ordinary way with great precision, no attempt has been made to follow other than familiar terminology.

Relative Solubilities of Dyes in Immiscible Solvents

DYE GROUPS

Coloring matters grouped in accordance with their approximate relative distribution in certain immiscible solvents, as observed with commercial dyes in concentrations of about 0.05%—0.005%. Statements refer in all cases to the relative amount of dye taken up by the organic solvent.

The following abbreviations are used:

S-1	**Nearly all dye extracted.**
S-2	**Chief part of dye extracted.**
S-3	**More than one-half of dye extracted.**
W-3	**Less than one-half of dye extracted.**
W-2	**Chief part of dye not extracted.**
W-1	**Little dye extracted.**
P	**Dye precipitated.**
PS	**Dye precipitated and extracted.**
N	**Normal (Equivalent Normal).**
4N	**Four-normal.**
N/64	**Sixty fourth-normal, etc.**

Group 1

C. I. No.	Finding No.	Name
800	(1a)	Quinoline Yellow, s.s.
19	(1b)	Oil Yellow
15	(1c)	Aminoazobenzol
17	(1d)	Aminoazotoluol
22	(1e)	Oil Yellow AB
61	(1f)	Oil Yellow OB
44	(1g)	Paranitraniline Red
24	(1h)	Sudan I
73	(1i)	Sudan II
82	(1j)	Naphthylamine Bordeaux
248	(1k)	Sudan III
258	(1l)	Sudan IV
Pr.45	(1m)	Celliton Red Violet R
(1075)	(1n)	Base, Alizarine Astrol B
(1088)	(1o)	Base, Alizarine Sky Blue B
(1078)	(1p)	Base, Alizarine Cyanine Green G

The dyes of this group are insoluble in alkaline, neutral or weakly acidaqueous liquids, but are soluble in petroleum ether, ether, amyl alcohol and most other organic liquids.

Petroleum ether and N/4 hydrochloric acid

15 (1c)	W-1
19 (1b)	S-2
All others	S-1

Petroleum ether and 7N-sulfuric acid

15 (1c), 17 (1d), 19 (1b)	W-1
All others	S-1

Petroleum ether and 12N-sulfuric acid

15 (1c), 17 (1d), 19 (1b), (1075) (1n)	W-1
800 (1a)	W-3
44 (1g), 82 (1j), 73 (1i), 24 (1h), 248 (1k), 258 (1l), (1088) (1o)	S-2
	S-1

Petroleum ether and 16N-sulfuric acid

15 (1c), 17 (1d), 19 (1b), (1075) (1n)	W-1
800 (1a)	W-2
24 (1h), 44 (1g), 73 (1i), 82 (1j), (1078) (1p), 248 (1k), 258 (1l), (1088) (1o)	S-1

Petroleum ether and 20N-sulfuric acid

82 (1j)	S-1 or S-2, P
(1078) (1p)	S-2 or S-3
24 (1h), 44 (1g)	W-3
(1088) (1o)	W-2
Others of group	W-1

Petroleum ether and 24N-sulfuric acid

Group W-1 or W-1, P

(Celliton Red Violet R is nearly insoluble in petroleum ether. With ethyl ether and 4N-hydrochloric acid, S-2. With ethyl ether and hydrochloric acid N and below, S-1. 689, 860, and 864 listed under Group 2 are somewhat similar.)

Group 2

C. I. No.	Finding No.	Name
655	(2a)	Auramine
788	(2b)	Acridine Orange NO
793	(2c)	Phosphine
20	(2d)	Chrysoidine G
21	(2e)	Chrysoidine R
331	(2f)	Bismarck Brown G
332	(2g)	Bismarck Brown R
841	(2h)	Safranine
752	(2i)	Rhodamine 6G
677	(2j)	Fuchsine
749	(2k)	Rhodamine B
825	(2l)	Neutral Red
680	(2m)	Methyl Violet B
681	(2n)	Crystal Violet
920	(2o)	Thionine
731	(2p)	Night Blue
*860	(2q)	Induline s.s.
*864	(2r)	Nigrosine
877	(2s)	Brilliant Cresyl Blue
*689	(2t)	Spirit Blue
729	(2u)	Victoria Blue B
925	(2v)	Toluidine Blue
133	(2w)	Janus Green B
662	(2x)	Brilliant Green
657	(2y)	Malachite Green

* Placed in this group though nearly insoluble in water.

Ether and N/2 or N potassium hydroxide solution

(Ether solutions of the color bases may be colorless or nearly so.) Numbers 689 (2t), 860 (2q), and 864 (2r) have been included with this group but are nearly insoluble in ether or in aqueous liquids and in ether-aqueous mixtures collect as precipitate at the solvent interface.

All dyes of group except as stated S-1 or S-2

Ether and N acetic acid, or N/64 to 4N hydrochloric acid

All dyes of group except as stated W-1 or W-2

(With high acidities some dyes may be partially precipitated.)

1:1 Amyl alcohol-petroleum ether mixture and N/64 hydrochloric acid

689 (2t), 860 (2q), 864 (2r), 15 (1c), 729 (2u)	S-1 or SP
749 (2k), 752 (2i)	S-2
680 (2m)	S-3
657 (2y), 677 (2j)	W-3
All others	W-1 or W-2

1:1 Amyl alcohol-petroleum ether mixture and 4N hydrochloric acid

689 (2t), 860 (2q), 864 (2r), 15 (1c)	S-1 or SP
20 (2d), 21 (2e), 749 (2k), 752 (2i)	S-2 or S-3
841 (2h)	W-3
All others	W-1

Amyl alcohol and N/64 hydrochloric acid

331 (2f), 332 (2g)	W-2
920 (2o)	W-3
793 (2c)	S-3
20 (2d), 21 (2e), 677 (2j), 925 (2v)	S-2
All others	S-1

Amyl alcohol and N/4 hydrochloric acid

925 (2v)	W-1
331 (2f), 332 (2g), 662 (2x), 677 (2j), 793 (2c)	W-3
655 (2a), 877 (2s)	S-3
133 (2w), 680 (2m), 681 (2n), 920 (2o)	S-2
All others	S-1

Amyl alcohol and 4N hydrochloric acid

677 (2j), 680 (2m), 681 (2n), 925 (2v)	W-1
655 (2a), 657 (2y), 662 (2x)	W-2
133 (2w), 331 (2f), 332 (2g), 825 (2l)	W-3
788 (2b), 793 (2c), 841 (2h), 920 (2o)	S-3
All others	S-1

Amyl alcohol and N sodium chloride solution

All of group S-1

1:1 Aniline-amyl alcohol mixture and N/64 to N/8 hydrochloric acid, also

1:2 n-Butylamine-amyl alcohol mixture and N/16 to N/8 hydrochloric acid

All of group S-1

Group 3

C. I. No.	Finding No.	Name
695	(3a)	Acid Violet 4BN
698	(3b)	Formyl Violet S4B
909	(3c)	New Blue R
704	(3d)	Alkali Blue
714	(3e)	Patent Blue A
922	(3f)	Methylene Blue
924	(3g)	Methylene Green B
666	(3h)	Guinea Green B
667	(3i)	Brilliant Milling Green B

Ether and N/2 or N potassium hydroxide

All dyes of group except 909 and 922 which partially change on warming with the alkali to give ether-soluble bases	W-1

Ether and hydrochloric acid N/64 to 4N

All dyes of group W-1

1:1 Amyl alcohol-petroleum ether mixture and hydrochloric acid N/64 to 4N

All dyes of group W-1

Amyl alcohol and N sodium chloride

All dyes of group S-1 or S-2

Amyl alcohol and N/64 hydrochloric acid

924 (3g), 909 (3c), 922 (3f)	S-3
All others	S-1 or S-2

Amyl alcohol and 4N hydrochloric acid

704 (3d), 909 (3c)	S-1 or S-2
924 (3g), 666 (3h), 667 (3i)	S-3 or W-3
922 (3f)	W-2
695 (3a), 698 (3b)	W-1

Group 4

C. I. No.	Finding No.	Name
*142	(4a)	Methyl Orange
692	(4b)	Acid Magenta
406	(4c)	Benzo Blue 2B
477	(4d)	Benzo Blue 3B
865	(4e)	Nigrosine W.S.
520	(4f)	Benzo Sky Blue
712	(4g)	Patent Blue V
1054	(4h)	Alizarine Saphirol B
1053	(4i)	Alizarine Saphirol SE
671	(4j)	Erioglaucine
	(4k)	Brilliant Blue
684	(4l)	Methyl Green
670	(4m)	Light Green SF Yellowish
	(4n)	Fast Green
737	(4p)	Wool Green S

* Placed in this group though of anomalous solubility properties.

Ether and alkaline, neutral or acid aqueous solutions

All dyes of group	W-1

1:1 Amyl alcohol-petroleum ether mixture and hydrochloric acid N/64 to 4N

All dyes of group	W-1

Amyl alcohol and N sodium chloride solution

142 (4a)	S-2
712 (4g)	W-3
865 (4e)	WP
All others	W-1

1:1 Aniline-amyl alcohol mixture and N/32 hydrochloric acid

All dyes of group	S-1 or S-2

1:1 Aniline-amyl alcohol mixture and N potassium hydroxide

671 (4j)	S-1
670 (4m)	S-2
737 (4p), Fast green FCF	W-2

1:2 n-Butylamine-amyl alcohol mixture and N/32 hydrochloric acid

142 (4a), 684 (4l)	S-1
477 (4d), 670 (4m)	S-2
671 (4j), 737 (4p), 865 (4e), 692 (4b), 1054 (4h), Fast green FCF	W-2
406 (4c), 520 (4f)	W-3 or S-3

1:2 n-Butylamine-amyl alcohol mixture and N potassium hydroxide

142 (4a), 684 (4l)	S-1
670 (4m), 671 (4j)	S-3 or W-3
Others	W-1

Group 5

C. I. No.	Finding No.	Name
812	(5a)	Primuline
814	(5b)	Chloramine Yellow
622	(5c)	Mikado Yellow
596	(5d)	Benzamine Brown 3GO
621	(5e)	Mikado Orange
415	(5f)	Benzo Orange R
420	(5g)	Diamine Brown M
561	(5h)	Trisulphone Brown B
598	(5i)	Congo Brown G
Pr.47	(5j)	Chlorantine Fast Brown BRL
326	(5k)	Benzo Fast Scarlet
418	(5l)	Diamine Fast Red F
448	(5m)	Benzopurpurine 4B
495	(5n)	Benzopurpurine 10B
225	(5o)	Rosophenine 10B
370	(5p)	Congo Red
375	(5q)	Congo Corinth G
394	(5r)	Diamine Violet N
387	(5s)	Trisulphone Violet B
539	(5t)	Columbia Black FF ex.
581	(5u)	Direct Deep Black EW
582	(5v)	Direct Deep Black RW
472	(5w)	Benzo Blue BX
401	(5x)	Diamine Black BH
502	(5y)	Benzoazurine G
512	(5z)	Benzo Blue RW
593	(5za)	Diamine Green B
583	(5zb)	Chlorazol Dark Green
589	(5zc)	Chloramine Green B
594	(5zd)	Diamine Green G

Data on the relative distributions of the dyes classed together as Group 5 are unsatisfactory because of the insolubility of the substances, and their tendency to form colloidal suspensions.

The dyes of this group are sodium salts of very insoluble color acids. When the aqueous solutions of the dyes are made 4-normal with hydrochloric acid and shaken with 1:1 amyl alcohol-petroleum ether mixture, nearly all dye (as color acid) collects as a precipitate between the solvent layers.

1:1 aniline-amyl alcohol mixture and hydrochloric acid N/64 to N/32

All dyes of group	S-1 (Some in colloidal suspension).

1:1 aniline-amyl alcohol mixture and N/2 to N potassium hydroxide

370 (5p), 448 (5m), 495 (5n), 419 (5l)	S-1 (In solution).
539 (5t), 581 (5u), 582 (5v), 582 (5v)	S-1 (More or less in colloidal suspension).
Others	W-2 to W-1

1:2 n-Butylamine-amyl alcohol mixture and N/32 hydrochloric acid

Dyes of group	S-1 or S-2

1:2 n-Butylamine-amyl alcohol mixture and N potassium hydroxide

370 (5p), 448 (5m)	
495 (5n)	S-1 (In solution).
375 (5q), 419 (5l), 539 (5t), 581 (5u), 582 (5v), 596 (5d), 394 (5r), 812 (5a), 415 (5f), 593 (5za), 512 (5z), 589 (5zc), 598 (5i), perhaps 621 (5e), and 622 (5c)	S-1 to S-2 (More or less in colloidal suspension).
225 (5o), 326 (5k)	W-1 to W-2 (In solution).
387 (5s), 401 (5x), 420 (5g), 502 (5y), 561 (5h), 583 (5zb), 594 (5zd), 472 (5w)	W-1 to W-2 (More or less in colloidal suspension).

Group 6

C. I. No.	Finding No.	Name
1027	(6a)	Alizarine VI
9	(6b)	Martius Yellow
36	(6c)	Alizarine Yellow 2G
211	(6d)	Methyl Red
766	(6e)	Uranine
23	(6f)	Sudan G
727	(6g)	Chrome Violet
40	(6h)	Alizarine Yellow R
8	(6i)	Victoria Yellow
410	(6j)	Chrysamine G
480	(6k)	Chrysamine R
720	(6l)	Eriochrome Azurol B
12	(6m)	Aurantia
101	(6n)	Metachrome Brown B
772	(6o)	Erythrosine Yellowish
431	(6p)	Anthracene Red
724	(6q)	Rosolic Acid
768	(6r)	Eosine G
774	(6s)	Phloxine B
773	(6t)	Erythrosine Bluish
777	(6u)	Rose Bengale
779	(6v)	Rose Bengale B
204	(6w)	Eriochrome Black A
299	(6x)	Diamond Black F

Ether and hydrochloric acid N/64 to N/16

All dyes of group	S-1 or S-2

Ether and hydrochloric acid N

211 (6d), 101 (6n), 766 (6e), 724 (6q)	W-3 or W-2
Others of group	S-1

Ether and 4N hydrochloric acid

211 (6d), 101 (6n), 766 (6e), 724 (6q)	W-1
All others of group	S-1

1:1 Amyl alcohol-petroleum ether mixture and hydrochloric acid N/64 to N

All dyes of group	S-1

1:1 Amyl alcohol-petroleum ether mixture and hydrochloric acid 4N

211 (6d)	W-2
101 (6n)	S-3
All others of group	S-1

Amyl alcohol and N sodium chloride

All dyes of group except fluorescein derivatives and 431 (6p)	S-1

Amyl alcohol and hydrochloric acid N/64 to 4N

All dyes of group	S-1

Amyl alcohol mixtures with aniline or n-butylamine, and hydrochloric acid N/64 to N/32

All dyes of group	S-1

Group 7

C. I. No.	Finding No.	Name
636	(7a)	Fast Light Yellow
145	(7b)	Azoflavine RS
146	(7c)	Azo Yellow
365	(7d)	Chrysophenine
11	(7e)	Amido Yellow E
138	(7f)	Metanil Yellow
143	(7g)	Orange IV
652	(7h)	Eriochrome Red B
26	(7i)	Croceine Orange G
151	(7j)	Orange II
161	(7k)	Orange R
175	(7l)	Naphthylamine Brown
234	(7m)	Resorcine Brown
165	(7n)	Lake Red C
189	(7o)	Lithol Red R
176	(7p)	Fast Red A
1091	(7q)	Alizarine Rubinol
202	(7r)	Eriochrome Blue Black R
289	(7s)	Sulphon Cyanine 5R Ex.
307	(7t)	Sulphon Cyanine Black B
1085	(7u)	Alizarine Blue Black B
833	(7v)	Wool Fast Blue
1073	(7w)	Alizarine Irisol R
1088	(7x)	Alizarine Sky Blue B
1075	(7y)	Alizarine Astrol B

Ether and N/64 hydrochloric acid

All dyes of group	W-1 or W-2

Ether and 4N hydrochloric acid

189 (7o), 652 (7h), 1088 (7x)	S-1
176 (7p), 175 (7l), 145 (7b), 165 (7n), 202 (7r), 1073 (7w)	S-2
All others of group	W-2 or W-1 or P

1:1 Amyl alcohol-petroleum ether mixture and N/64 hydrochloric acid

All dyes of group	S-3 to S-1

1:1 Amyl alcohol-petroleum ether mixture and hydrochloric acid N/4 to 4N

1091 (7q)	PS
All others of group	S-1

Amyl alcohol and N sodium chloride

All dyes of group	S-2 or S-1

Amyl alcohol and hydrochloric acid N/64 to 4N

All dyes of group	S-1

Amyl alcohol mixtures with aniline or n-butylamine, and hydrochloric acid N/64 to N/32

All dyes of group	S-1

Group 8

C. I. No.	Finding No.	Name
7	(8a)	Picric Acid
801	(8b)	Quinoline Yellow
364	(8c)	Brilliant Yellow
148	(8d)	Tropaeolin O
150	(8e)	Orange I
1034	(8f)	Alizarine Red S
235	(8g)	Resorcin Dark Brown
280	(8h)	Ponceau 3RB
430	(8i)	Polar Red
382	(8j)	Diamine Scarlet B
80	(8k)	Ponceau 3R
278	(8l)	Benzo Fast Red 8BL
252	(8m)	Brilliant Croceine M
130	(8n)	Erika B
182	(8o)	Fast Red E
88	(8p)	Fast Red B
179	(8q)	Azo Rubine
262	(8r)	Cloth Red B
170	(8s)	Diamond Black PV
180	(8t)	Diamond Blue 3B
758	(8u)	Violamine R
1242	(8v)	Azolitmin
246	(8w)	Naphthol Blue Black
1078	(8x)	Alizarine Cyanine Green

Ether and hydrochloric acid N/64 to 4N

7 (8a), at N/64	S-3
7 (8a), at higher normalities	S-2 or S-1
All others	W-1

1:1 Amyl alcohol-petroleum ether mixture and N/64 hydrochloric acid

382 (8j), 262 (8r), 150 (8e)	W-3
170 (8s), 758 (8u)	W-2
Others	W-1

1:1 Amyl alcohol-petroleum ether mixture and N hydrochloric acid

382 (8j), 262 (8r), 150 (8e), 170 (8s), 430 (8i), 364 (8c), 1078 (8x)	S-1
Others	S-3

1:1 Amyl alcohol-petroleum ether mixture and 4N hydrochloric acid

430 (8i)	SP
All others in group	S-1

Amyl alcohol and N/64 hydrochloric acid

All dyes of group	S-3 to S-1

Amyl alcohol and hydrochloric acid N/16 to 4N

All dyes of group	S-1

Amyl alcohol and N sodium chloride

382 (8j), 262 (8r), 150 (8e), 170 (8s), 364 (8c), 1078 (8x), 7 (8a), 252 (8m)	S-3 to S-1
246 (8w), 801 (8b), 235 (8g), 180 (8t), 179 (8q), 88 (8p), 80 (8k)	W-2 or W-1

Amyl alcohol mixtures with aniline or n-butylamine, and hydrochloric acid N/32

All dyes of group	S-1

Group 9

C. I. No.	Finding No.	Name
10	(9a)	Naphthol Yellow S
639	(9b)	Xylene Light Yellow
27	(9c)	Orange G
	(9d)	Sunset Yellow
1239	(9e)	Carminic Acid
216	(9f)	Acid Alizarine Red B
79	(9g)	Ponceau R
	(9h)	Ponceau SX
29	(9i)	Chromotrope 2R
31	(10f)	Amido Naphthol Red G
153	(9j)	Azofuchsine G
209	(9k)	Sulphon Acid Blue B
518	(9l)	Diamine Sky Blue FF

Ether and hydrochloric acid N/64 to 4N

All dyes of group	W-1

1:1 Amyl alcohol-petroleum ether mixture and hydrochloric acid N/64 to N

All dyes of group	W-3 to W-1

1:1 Amyl alcohol-petroleum ether mixture and 4N hydrochloric acid

All dyes of group	S-3 to S-1

Amyl alcohol and N sodium chloride

All dyes of group	W-1

Amyl alcohol and N/64 hydrochloric acid

79 (9g), 1239 (9e), 10 (9a)	S-3 or S-2
209 (9k), 216 (9f), 153 (9j), 29 (9i), 27 (9c), 518 (9l), 31 (10f), Sunset Yellow	W-3 or W-2

Amyl alcohol and N/16 hydrochloric acid

79 (9g), 1239 (9e), 10 (9a)	S-1
Others of group	S-3 to W-2

Amyl alcohol and N/4 hydrochloric acid

79 (9g), 1239 (9e), 10 (9a), 209 (9k)	S-1
Others of group	S-3

Amyl alcohol and hydrochloric acid N and 4N

All dyes of group	S-1

Group 10

C. I. No.	Finding No.	Name
16	(10a)	Fast Yellow
620	(10b)	Sun Yellow
640	(10c)	Tartrazine
Pr.101	(10d)	Guinea Fast Red BL
185	(10e)	Cochineal Red A
31	(10f)	Amido Naphthol Red G
30	(10g)	Fast Acid Fuchsine B
57	(10h)	Amido Naphthol Red 6B
184	(10i)	Amaranth
56	(10j)	Chromotrope 6B
53	(10k)	Victoria Violet 4BS
208	(10l)	Sulphon Acid Blue R
707	(10m)	Soluble Blue
1180	(10n)	Indigotin IA
	(10o)	Monastrial Blue
5	(10p)	Naphthol Green B

Ether and hydrochloric acid N/64 to 4N

All dyes of group	W-1

1:1 Amyl alcohol-petroleum ether mixture and hydrochloric acid N/64 to N

All dyes of group	W-1

1:1 Amyl alcohol-petroleum ether mixture and 4N hydrochloric acid

31 (10f)	S-3
Others dyes of group	W-3 to W-1

Amyl alcohol and N sodium chloride

All dyes of group	W-1

Amyl alcohol and hydrochloric acid N/64 to N/16

Group	S-3 to W-1

Amyl alcohol and hydrochloric acid N/4

30 (10g), 208 (10l), 707 (10m), 31 (10f), 56 (10j)	S-3 to S-1
Others of group	W-2 to W-1

Amyl alcohol and hydrochloric acid N

30 (10g), 208 (10l), 707 (10m), 31 (10f), 56 (10j), 57 (10h), Pr.101 (10d)	S-2 or S-1
5 (10p) (easily destroyed)	W-3
640 (10c), 185 (10e), 184 (10i), 620 (10b)	S-3
1180 (10n), 16 (10a), 53 (10k), Monastrial blue (10o)	W-3

Amyl alcohol and hydrochloric acid 4N

All dyes of group	S-3 to S-1

1:1 Amyl alcohol-aniline mixture and N/32 hydrochloric acid

640 (10c)	W-2
All others of group	S-2 or S-1

1:2 n-butylamine-amyl alcohol mixture and N/32 hydrochloric acid

1180 (10n), 16 (10a)	S-2 or S-1
184 (10i), 185 (10e)	W-2
640 (10c), 53 (10k)	W-1

Phthalein Indicators

Designation	Name
a	Dibromothymolsulfonphthalein
b	Dibromocresolsulfonphthalein
c	Tetrabromophenolsulfonphthalein
d	Thymolphthalein
e	Alpha-naphtholphthalein
f	Thymolsulfonphthalein
g	Phenolphthalein
h	o-Cresolsulfonphthalein
i	Phenolsulfonphthalein

Petroleum ether and hydrochloric acid N/64 to 4N

a	S-1 or S-2
b, c (except S-2 or S-3 at acid normality 4)	W-1
d, e, f	WP or P
g, h, i	W-1

Ether and hydrochloric acid N/64 to 4N

h	S-3 or W-3
i	W-2 or W-1
Others	S-1

In general solubilities are similar to those of dyes of Group 6.

Bromine Oxidation Test

In this test (U. S. Department Agriculture, *Bur. Chem. Circ.* 114, U. S. Dept. Agr., *Bur. Chem. Bull.* 448, Page 47) the dilute dye solution is treated with bromine water, excess of bromine removed by addition of a slight excess of hydrazine sulfate solution, and any diazo compound produced then coupled with a-naphthol. Since the hydrazine compound reacts almost instantly with bromine, and but slowly with most diazoniun salts, it provides a convenient means of freeing the solution from the excess of active halogen. A description of the test is given below.

Bromine is used as the saturated aqueous solution which contains about 3% halogen, and is approximately 0.38 normal as oxidizing agent; or bromine vapor can be poured into the test tube containing the dye solution the latter being shaken to promote absorption. Hydrazine sulfate is conveniently employed as the saturated water solution, which at room temperature contains about 3.4% $(NH_2)_2H_2SO_4$ and reduces about 3.0 times its volume of the saturated bromine water. Other reagents are, a 10% to 20% aqueous sodium carbonate solution, and a freshly made alcoholic a-naphthol solution, suitably about 5%.

Two to 10 ml. of the dye solution or solvent fraction which may contain 0.005% to 0.1% coloring matter is poured into a 50 ml. test tube, and 0.1 to 0.3 ml. of the naphthol solution is placed in a second similar tube in readiness for the coupling. The dye solution is then treated with bromine water in sufficient quantity to bleach the coloring matter, or to indicate by the brownish appearance of the mixture that a moderate excess of the halogen has been added, 1/20 volume bromine water being enough with dyes reacting readily, 1/4 volume perhaps being required with resistant colors. Hydrazine sulfate solution is then added in amount somewhat greater than that required to combine with all free halogen, the liquids quickly mixed by swirling or shaking and 1/2 to 3/4 of the mixture then poured into the test tube containing the a-naphthol. Without delay both portions are made slightly alkaline by addition of the sodium carbonate solution, the naphthol-free portion serving as a control or blank to show if coupling has taken place. The dye solution should be neutral or slightly acid with hydrochloric acid before the bromine is added. With most azo dyes the oxidation is more nearly confined to a single type of reaction if carried out in an acidified solution, but practically the same results are obtained when bromine is added to the neutral solution. The precipitates of color acids formed when solutions of direct dyes are acidified are less rapidly oxidized by bromine and neutral solutions of these dyes are used to avoid this difficulty. The more complex reactions observed with alkaline solutions appear to have restricted applicability as tests.

Oil soluble dyes are first dissolved in a few ml. glacial acetic acid, a little water then added, and the solution carried through as described. Wide test tubes are used in this case to avoid loss by foaming when the considerable amount of sodium carbonate required to neutralize the acetic acid is added. The very insoluble and resistant paranitraniline red must be oxidized by treating the solution of the dye in strong acetic acid with 1/2 to 3/4 volume bromine water.

In general azo dyes are oxidized by the bromine to form the same diazo compounds* as those employed for making the coloring matters in question; that is, to give the diazo compounds of the amines ordinarily called the "first components". With polyazo dyes, intermediate azo-diazo compounds are often obtained when the bromine is added carefully and in limited amount.

If coupling is indicated by the appearance

* Replacement in the ring structure with appreciable modification of solubility properties has not been observed.

of the naphthol test portion the latter may be shaken with ether when most of the derived coloring matter passes into the ether layer if the first or diazo component of the original dye was unsulfonated; most remains in the lower aqueous layer if the first component was sulfonated or carboxylated. The ether dye solutions usually are yellow or brown, and hence may appear to contain relatively less coloring matter because of this light hue. The layer containing the new coloring matter may be separated, and cautiously mixed with three to four volumes concentrated hydrochloric acid to bring out the more characteristic colors shown by the a-naphthol derivatives in strongly acid solvents. With a large excess of concentrated hydrochloric acid the yellowish-brown ether solution of benzeneazo-a-naphthol becomes violet, that of a-naphthaleneazo-a-naphthol, blue, etc. Similarly the sulfonated derivatives, which if present, remain in chief proportion in the aqueous layer of the coupling mixture change hue with excess of acid, sulfobenzeneazo-a-naphthol giving a violet-red, etc.

The typical coupling reactions tend to be incomplete and masked with most of the polyazo direct cotton dyes. Many of them appear to resist complete fission by bromine, probably partly because of their insolubility in acid liquids. Although partially bleached, some unchanged dye may be present when the hydrazine sulfate is added. Furthermore, the coupled a-naphthol derivatives of benzidine and its homologs are very low solubility in all common solvents. When both the control and the coupled portions are dark, five ml. portions of 1:2 n-butylamine-amyl alcohol mixture may be added to each tube and shaken; the upper layers if differing in hue are then poured off or separated and each treated with four to five volumes of concentrated hydrochloric acid. Disazo dyes from benzidine and homologs give the corresponding a-naphthol dyes which color the mixed solvent dull red. This becomes reddish-blue with the concentrated hydrochloric acid if the original coloring matter was from benzidine, greenish-blue if from dianisidine. Polyazo dyes having two or more diazo components give, usually, more than one coupled dye, and the butylamine solvent may then extract more than one derived coloring matter. The reaction with a-naphthol showing coupling and hence the presence of the azo group in the dye under test, is given to some extent by a large majority of the common classified azo coloring matters.

Certain monazo dyes such as Eriochrome black A derived from aminonaphthol as first component though bleached or changed to pale brown by bromine (not added in large excess), seem to form addition compounds since the original hue returns on addition of hydrazine sulfate and sodium carbonate, either with or without a-naphthol. Probably of like nature is the behavior of Bordeaux B and several similar sulfonated hydroxyazonaphthalene dyes, which show normal diazo cleavage when oxidized in acid solutions but other reactions in neutral and slightly alkaline mixtures. Bordeaux B, a-naphthaleneazo-R-salt, in neutral solution becomes pale brown on addition of bromine, the liquid changing to dull red with hydrazine sulfate. Addition of sodium carbonate gives a deep blue, either with or without previous addition of a-naphthol. The modified dye when separated by extracting from acid solution with amyl alcohol, washing, etc., is dull bluish-red in neutral and slightly acid solutions, clear deep blue in sodium carbonate solution, and dull red in sodium hydroxide solution. Distribution between amyl alcohol-petroleum ether mixture and dilute hydrochloric acid is similar to that of the parent dye but at equal acidity the oxidized coloring matter is slightly more soluble than the Bordeaux B in the aqueous layer. A solution of the oxidized dye, if decolorized with a few drops of strong titanium trichloride solution, neutralized with sodium acid carbonate, and shaken with ether gives an ether soluble substance which in dilute alcohol solution readily reacts with diazo compounds to form intensely colored dyes; however, if a slight excess of sodium hydroxide is used instead of the sodium acid carbonate before the extraction, the strong color reaction with diazo compounds is not obtained. The behavior indicates the ether soluble substance to be an aminonaphthol, since the a-naphthylamine formed from Bordeaux B by reduction is readily extracted by ether from sodium hydroxide solutions. Apparently, in neutral or slightly alkaline solutions bromine forms a colorless or pale yellow addition product with the Bordeaux B, oxidation, but no complete disruption of the dye taking place. On treatment with hydrazine sulfate, an hydroxy-naphthaleneazo-R-salt is produced.

Some few listed azo dyes in which the auxichrome groups have been inactivated by substitution, apparently do not undergo the characteristic cleavage at the azo linkage, for their solutions although readily bleached by the halogen show no further color changes with a-naphthol and sodium carbonate.

A considerable number of non-azo dyes are bleached by bromine, the original hue being restored on addition of hydrazine sulfate under the conditions of the test. The chemical reactions involved are not as well understood as with the diazo-coupling, but the color changes are reproducible and characteristic. This behavior, which seems to involve addition of bromine with formation of unstable compounds, is shown more or less definitely by most dyes of the azine group.

Aqueous solutions of many dyes, especially basic and direct coloring matters tend to give precipitates on the addition of bromine. These reactions are of limited value as tests since they may not be shown at high dilutions, are influenced by dissolved solvents, and are difficult to observe with dark colored solutions and with transparent or colloidal precipitates. Similarly, the transient color changes given in some cases by a trace of the halogen are affected by factors not easily controlled. The stability to bromine shown by most phthalic acid dyes, by nitro derivatives, and by such dyes as chloramine yellow are of some aid in their characterization.

Properties of some typical dyes obtained by coupling in the bromine test are shown below:

Dye	*Properties*
Benzeneazo-a-naphthol	Coupling mixture shaken with ether gives yellow or brown solution in the organic solvent. Ether solution with 3 to 4 volumes concentrated hydrochloric acid is violet red. Ether solution with alcoholic potassium hydroxide solution is orange.
Xyleneazo-a-naphthol	Coupling mixture with ether gives yellow or brown ether solution which when mixed with 3 to 4 volumes conc. hydrochloric acid is red-violet.
m-Nitrobenzeneazo-a-naphthol	As stated for benzeneazo-a-naphthol except red with alcoholic potassium hydroxide.
p-Nitrobenzeneazo-a-naphthol	As stated for benzeneazo-a-naphthol except reddish blue with alcoholic potassium hydroxide.
a-Naphthaleneazo-a-naphthol	Coupling mixture shaken with ether gives brown ether solution which with 3 to 4 volumes conc. hydrochloric acid is reddish blue, with alcoholic potassium hydroxide is red.
Diphenyldisazo-a-naphthol	Chief part precipitated in coupling mixture. Ether dissolves some dye forming a dull reddish solution which becomes violet blue with large excess of conc. hydrochloric acid, red with alcoholic potassium hydroxide.
Ditolyldisazo-a-naphthol	As stated for diphenyldisazo-a-naphthol but ether solution blue with large excess conc. hydrochloric acid.
Sulfobenzeneazo-a-naphthol	Not extracted in large proportion from coupling mixture by ether. See Orange I, No. 150.
Sulfonaphthaleneazo-a-naphthol	Not largely extracted from coupling mixture by ether. See Naphthylamine brown, No. 175.

Dyes in the table showing bleaching with bromine and color return with hydrazine sulfate are:

800 (1a)
801 (8b)
793 (2c)
841 (2h)
825 (2l)
833 (7v)
1073 (7w)

Also but more imperfectly:

1034 (8f)
1075 (1n)
1075 (7y)
860 (2q)
865 (4e)
877 (2s)
1053 (4i)
1054 (4h)
Pr. 45 (1m)

The azo dyes named below show addition reactions so that a strong color is obtained on bleaching with bromine and addition of hydrazine sulfate, followed with sodium carbonate, either with or without previous addition of a-naphthol.

53 (10k)
202 (7r)
539 (5t)
299 (6x)
204 (6w)
208 (10l)

Also in neutral, but not in strongly acid solutions:

175 (7l)
88 (8p)
184 (10i)

365 (9d) and 394 (5r) showed no coupling reaction, but the specimen of the latter tried perhaps was not the true dye. 430 (8e) showed a much stronger reaction after warming with alkali, and similar results were observed with several newer unclassified dyes.

Reactions of Dyes With Divanadyl Trisulfate in Concentrated Sulfuric Acid

A reagent made by dissolving vanadium pentoxide in concentrated sulfuric acid, when added to solutions of certain dyes in the same solvent, gives color changes useful for a limited number of differentiations. The solution is prepared by warming 0.25 g. powdered vanadium pentoxide with 50 ml. concentrated sulfuric acid, the solid dissolving quickly at 130-140 C. After standing for several weeks, a yellow vanadium salt may separate, but the mixture is readily brought back to its original condition by warming to 130 C. and allowing to cool.

Two to 5 ml. of the dilute solution of the dye in concentrated sulfuric acid as obtained in ascertaining the hue in this solvent is treated with 0.1 to 0.5 ml. of the vanadium reagent, added slowly so that color changes may be observed. The dye concentration should be about 0.05 to 0.003 g. per 100 ml. and as with most other tests some variation may be expected depending on the amount of dye present. Dark colored solutions are not likely to be made of too high concentration, but care must be taken with yellow and orange solutions where the concentrations are less easily judged from the appearance of the liquids.

The sulfuric acid solutions of most of the sulfonated azo dyes merely give yellow or brown colors with the vanadium solution though sometimes intermediate dark evanescent shades are observed. The final yellow hue is due to excess of reagent, not dye. The principal reaction taking place appears to be the usual oxidation cleavage with formation of diazo compounds, which latter may be coupled as in the bromine test though much less conveniently.

The yellow solutions of such unsulfonated azo dyes as aminoazobenzene and dimethylaminoazobenzene form moderately stable intermediate products which give the mixtures green or greenish blue hues. Green mixtures as obtained with the dyes mentioned when poured into water gave red solutions and the diluted acid liquids then appeared to contain considerable amounts of the original dyes but no coloring matters dissolving in concentrated sulfuric acid with blue or green color. It might be expected that the condensation reaction giving benzidine derivatives which is described in the German patents D. R. P. 84893 and 88597 would take place with aminoazobenzene and closely similar dyes but no evidence of this was observed. Aminoazobenzene-mono-sulfonic acid gives a much more transient green, and the disulfonic acid (acid yellow) shows scarcely any intermediate color.

The vanadium solution gives a purplish color with Amido Yellow, No. 11, which appears to be distinctive. The soluble anthraquinone derivatives for the most part do not show color changes. The reactions of the vat dyes are of some interest since these dyes being insoluble in most solvents are difficult to differentiate and the color reaction may be applied with lakes or other insoluble dispersions.

The most distinctive reaction shown in the table is that with Methylene Blue, the grass green sulfuric acid solution of which changes to an intense clear carmine red within a few seconds after the addition of 2 to 4 drops of the reagent. The red color gradually becomes duller, and within 15 to 30 minutes the liquid is again grass green. Addition of a few drops of reagent will again change the liquid to red, though of duller shade. If the brilliant red solution which is obtained after the first careful addition of the reagent is poured at once into 10 to 20 volumes of water, the dilute acid liquid so obtained has the clear greenish blue hue of Methylene Blue and shows a sharp spectral absorption band in the red, not distinguishable in position with a small spectroscope from that of the original dye. Toluidine Blue, No. 925, gives a dull red in this test but not the intense clear color.

The reaction with Methylene Blue also has been found to afford a sensitive test for hexavalent vanadium, a dilute solution of the dye in sulfuric acid being treated with the sulfuric acid solution of the material under test. Although no doubt the vanadium solution acts as an oxidizing agent the color reaction has not been obtained with sulfuric acid solutions of any other common oxidizing agents.

Color Changes of Solutions of Dyes With Sodium Hydrosulfite. $Na_2S_2O_4$

The dry salt is added a few particles at a time, carefully avoiding excess. If decolorization takes place, the liquid is shaken with air and perhaps warmed slightly. Aqueous solutions are used except with dyes of Group 1, and a few of those of Group 2 that are nearly insoluble in water, these being tested in aqueous alcoholic solutions. "Dec." indicates decolorized by sodium hydrosulfite; "res." indicates color of mixture restored by air.

Dyes with their chemical names listed in the order of their numbers as given in the *Colour Index*, Society of Dyers and Colourists, H. P. Rowe, Editor, 1928. The common or trade name given is that used in the 1946 Year Book of the American Association of Textile Chemists and Colorists. Finding numbers for the tabulated data are shown last.

C. I. No.	Common or Trade Name	Scientific Name (or Components)	Finding No.
5	Naphthol Green B	Ferric sodium salt of 1-nitroso-2-naphthol-6-sulfonic acid	10p
7	Picric Acid	Sym. Trinitrophenol	8a
8	Victoria Yellow	Salts of dinitrocresols	6l
9	Martius Yellow	Ammonium salt of 2-4-dinitro-a-naphthol	6b
10	Naphthol Yellow S	Sodium salt of 2-4-dinitro-a-naphthol-7-sulfonic acid	9a
11	Amido Yellow B	Dinitro-phenyl amino-methyl-diphenylamine sulfonic acid	7e

C. I. No.	Common or Trade Name	Scientific Name (or Components)	Finding No.
12	Aurantia	Ammonium salt of dipicrylamine	6m
15	Amido Azo Benzol	Aminoazobenzene hydrochloride	1c
16	Fast Yellow	Chiefly, sodium salt of amino-azobenzene disulfonic acid	10a
17	Amido Azo Toluol	Aminoazotoluene or its hydro-chloride	1d
19	Oil Yellow	Dimethylaminoazobenzene	1b
20	Chrysoidine G	Comp., aniline and m-phenylene-diamine	2b
21	Chrysoidine R	Comp., aniline and m-toluylene-diamine	2e
23	Sudan G	Benzene-azo resorcinol	6f
24	Sudan I	Benzeneazo-b-naphthol	1h
26	Croceine Orange G	Comp., aniline and b-naphthol-6-sulfonic acid	7i
27	Orange G	Comp., aniline and b-naphthol disulfonic acid G	9c
29	Chromotrop 2R	Comp., aniline and chromotropic acid	9i
30	Fast Acid Fuchsine B	Comp., aniline and H-acid (alk.)	10g
31	Amido Naphthol Red G	Comp., aniline and acetyl-H-acid (alk.)	10f
36	Alizarine Yellow 2G	Comp., m-Nitroaniline and salicylic acid	6c
40	Alizarine Yellow R	Comp., p-nitroaniline and salicylic acid	6h
44	Paranitraniline Red	p-nitrobenzene-azo-b-naphthol	1g
53	Victoria Violet 4BS	Comp., p-aminoacetanilide and chromotropic acid and sapon.	10k
56	Chromotrop 6B	Comp., p-aminoacetanilide and chromotropic acid	10j
57	Amido Naphthol Red 6B	Comp., p-aminoacetanilide and acetyl-H-acid (alk.)	10h
61	Oil Yellow OB	o-tolueneazo-b-naphthylamine	1f
73	Sudan II	Xylene-azo-b-naphthol	1i
79	Ponceau R	Comp., m-xylidine and b-naphthol-disulphonic acid R	9g
80	Ponceau 3R	Comp., pseudo-cumidine and R-salt	8k
82	Naphthylamine Bordeaux	a-naphthalene-azo-b-naphthol	1j
88	Fast Red B	Comp., a-naphthylamine and b-naphtholdisulfonic acid R	8p
101	Metachrome Brown B	Comp., picramic acid and m-toluylenediamine (or m-phenylene-diamine or chloro-m-phenylene-diamine)	6n
130	Erika B ex.	Comp., dehydrothio-m-xylidine and a-naphthol-3-8-disulfonic acid	8n
133	Janus Green B	Comp., safranine and dimethylaniline	2w
138	Metanil Yellow	Comp., metanilic acid and diphenylamine	7f
142	Methyl Orange	Comp., sulfanilic acid and dimethylaniline	4a
143	Orange IV	Comp., sulfanilic acid and diphenylamine	7g
145	Azoflavine RS	Comp., nitration of No. 143	7b
146	Azo Yellow	Comp., further nitration of No. 145	7c
148	Tropaeolin O	Comp., sulfanilic acid and resorcinol	8b
150	Orange I	Comp., sulfanilic acid and a-naphthol	8c
151	Orange II	Comp., sulfanilic acid and b-naphthol	7j
153	Azo Fuchsine G	Comp., sulfanilic acid and 1-8-dihydroxynaphthalene-4-sulfonic acid	9j
161	Orange R	Comp., o-toluidine-sulfonic acid and b-naphthol	7k
165	Lake Red C	Comp., o-chloro-m-toluidine-p-sulfonic acid and b-naphthol	7n
170	Diamond Black PV	Comp., o-aminophenol-p-sulfonic acid and 1-5-dihydroxy-naphthalene	8s
175	Naphthylamine Brown	Comp., naphthionic acid and a-naphthol	7l
176	Fast Red A	Comp., naphthionic acid and b-naphthol	7p
179	Azo Rubine	Comp., naphthionic acid and NW-acid	8q
180	Diamond Blue 3B	Comp., naphthionic acid and a-naphthol-5-sulfonic acid L	8t
182	Fast Red E	Comp., naphthionic acid and b-naphthol-6-sulfonic acid	8o
184	Amaranth	Comp., naphthionic acid and b-naphthol-3-6-disulfonic acid R	10i
185	Cochineal Red A	Comp., naphthionic acid and b-naphthol-6-8-disulfonic acid G	10e
189	Lithol Red R	Comp., b-naphthylamine-1-sulfonic acid and b-naphthol	7o
202	Eriochrome Blue Black R	Comp., a-amino-b-naphthol-4-sulfonic acid and b-naphthol	7r
204	Eriochrome Black A	Comp., 5-nitro-a-amino-b-naphthol-4-sulfonic acid and b-naphthol	6w
208	Sulphon Acid Blue R	Comp., H-acid and phenyl-a-naphthylamine-8-sulfonic acid	10l
209	Sulphon Acid Blue B	Comp., H-acid and p-tolyl-a-naphthylamine-8-sulfonic acid	9k
211	Methyl Red	Comp., anthranilic acid and dimethylaniline	6d
216	Acid Alizarine Red B	Comp., anthranilic acid and b-naphthol-disulfonic acid R	9f
225	Rosophenine 10B	Comp., primuline and NW-acid	5o
234	Resorcin Brown	Comp., sulfanilic acid and m-xylidine and resorcinol	7m
235	Resorcin Dark Brown	Comp., naphthionic acid (2 mol.) and resorcinol	8g
246	Naphthol Blue Black	Comp., p-nitroaniline (acid) and aniline (alk.) to H-acid	8w
248	Sudan III	Benzene-azo-benzene-azo-6-naphthol	1k
252	Brilliant Croceine M	Comp., aminoazobenzene and b-naphthol-6-8-disulfonic acid G	8m
258	Sudan IV	o-toluene-azo-o-toluene-azo-b-naphthol	1l
262	Cloth Red B	Comp., aminoazotoluene and b-naphthol disulfonic acid R	8r
278	Benzo Fast Red 8BL	Comp., aminoazobenzene sulfonic acid and 2-benzoylamino-5-naphthol-7-sulfonic acid J. (alk.)	8l
280	Ponceau 3RB	Comp., aminoazobenzene disulfonic acid and b-naphthol	8h
289	Sulphon Cyanine 5R Ex.	Comp., metanilic acid and a-naphthylamine and p-tolyl-a-naphthylamine-8-sulfonic acid	7s
299	Diamond Black F	Comp., aminosalicylic acid to a-naphthylamine to NW-acid (or a-naphthol sulfonic acid L)	6x
307	Sulphon Cyanine Black B	Comp., a-naphthylamine-5-sulfonic acid to a-naphthylamine to phenyl-a-naphthylamine sulfonic acid S (phenyl peri acid)	7t
326	Benzo Fast Scarlet	Azo derivatives of 2-amino-5-naphthol-7-sulfonic acid (J-acid) condensation products with phosgene, ethylene halides, chloracetyl chloride, etc.	5k
331	Bismarck Brown G	Comp., chiefly m-phenylenediamine and (2 mol.) m-phenylenediamine	2f
332	Bismarck Brown R	Comp., m-toluylene diamine and (2 mol.) m-toluylenediamine	2g
364	Brilliant Yellow	Comp., diaminostilbene disulfonic acid and (2 mol.) phenol	8c
365	Chrysophenine	Comp., ethylation of No. 364	7d
370	Congo Red	Comp., benzidine and (2 mol.) naphthionic acid	5p
375	Congo Corinth G	Comp., benzidine and naphthionic acid and NW-acid	5q
382	Diamine Scarlet B	Comp., benzidine and b-naphthol disulfonic acid G and phenol (and ethylate)	8j
387	Trisulphon Violet B	Comp., benzidine and a-naphthol-3-6-8-trisulfonic acid and b-naphthol	5s
394	Diamine Violet N	Comp., benzidine and gamma acid (acid) and gamma acid (aminonaphthol-sulfonic acid 2-8-6) (acid)	5r
401	Diamine Black BH	Comp., benzidine and (alk.) gamma acid and (alk.) H-acid	5x
406	Benzo Blue BB	Comp., benzidine and (2 mol.) H-acid	4c
410	Chrysamine G	Comp., benzidine and (2 mol.) salicylic acid	6j
415	Benzo Orange R	Comp., benzidine and salicylic acid and naphthionic acid	5f
419	Diamine Fast Red F	Comp., benzidine and salicylic acid and (acid) gamma acid	5l
420	Diamine Brown M	Comp., benzidine and salicylic acid and (alk.) aminonaphthol sulfonic acid, gamma	5g
430	Polar Red	Comp., example, benzidine and m-cresol and G-acid (and treat with toluene-p-sulfonyl chloride)	8i
431	Anthracene Red	Comp., nitrobenzidine and salicylic acid and NW-acid	6p
448	Benzopurpurine 4B	Comp., tolidine and (2 mol.) naphthionic acid	5m
472	Benzo Blue BX	Comp., tolidine and (alk.) H-acid and NW-acid	5w
477	Benzo Blue 3B	Comp., tolidine and (2 mol.) H-acid (alk.)	4d
480	Chrysamine R	Comp., tolidine and (2 mol.) salicylic acid	6k
495	Benzopurpurine 10B	Comp., dianisidine and (2 mol.) naphthionic acid	5n
502	Benzoazurine G	Comp., dianisidine and (2 mol.) NW-acid	5y
512	Benzo Blue RW	Comp., dianisidine and b-naphthol and aminonaphthol disulfonic acid 2S (alk.)	5z
518	Diamine Sky Blue FF	Comp., dianisidine (2 mol.) 1-amino-8-naphthol-2-4-disulfonic acid 2S (alk.)	9l
520	Benzo Sky Blue	Comp., dianisidine and (2 mol.) H-acid	4f
539	Columbia Black FF Ex.	Comp., aminoacetanilide to (alk.) gamma acid to m-phenylene-diamine. Hydrolyze and Cleve's acid	5t
561	Trisulphone Brown B	Comp., naphthionic acid and aminonaphthol disulfonic acid 2R and m-toluenediamine and benzidine and salicylic acid	5h
581	Direct Deep Black EW	Comp., benzidine and m-phenylenediamine and H-acid and aniline	5u
582	Direct Deep Black RW	Comp., benzidine and m-toluylene-diamine and H-acid and aniline	5o
583	Chlorazol Dark Green	Comp., benzidine and phenol and H-acid and aniline	5zb

C. I. No.	Common or Trade Name	Scientific Name (or Components)	Finding No.
589	Chloramine Green B	Comp., benzidine and phenol and H-acid and dichloroaniline	5zc
593	Diamine Green B	Comp., benzidine and phenol and H-acid and p-nitroaniline	5za
594	Diamine Green G	Comp., benzidine and salicylic acid and H-acid and p-nitroaniline	5zd
596	Benzamine Brown 3GO	Comp., benzidine and salicylic acid and m-phenylenediamine and sulfanilic acid	5d
598	Congo Brown G	Comp., benzidine and salicylic acid and resorcinol and sulfanilic acid	5i
620	Sun Yellow	Sodium salt of azoxy-azo-distilbene-tetrasulfonic acid	10b
621	Mikado Orange	Sodium salt of disazo-distilbene-tetrasulfonic acid	5e
622	Mikado Yellow	Sodium salt of dinitro-azo-distilbene-tetrasulfonic acid	5c
636	Fast Light Yellow	Comp., aniline and 1-p-sulfophenyl-3-methly-5-pyrazolone	7a
639	Xylene Light Yellow	Comp., example, sulfanilic acid and 1-o-m-dichloro-p-sulfophenyl-3-methyl-5-pyrazolone	9b
640	Tartrazine	Comp., phenylhydrazine-p-sulfonic acid and dioxytartaric acid	10c
652	Eriochrome Red B	Comp., 1-amino-2-naphthol-4-sulfonic acid and 1-phenyl-3-methyl-5-pyrazolone	7h
655	Auramine	Hydrochloride of tetramethyl-diamino-diphenyl-ketonimine	2a
657	Malachite Green	Salt of pp-tetramethyldiamino-triphenylcarbinol anhydride	2y
662	Brilliant Green	Sulfate of tetraethyldiamino-triphenylcarbinol anhydride	2x
666	Guinea Green B	Sodium salt of dibenzyl diethyl diamino-triphenylcarbinol di-sulfonic acid anhydride	3h
667	Brilliant Milling Green B	Sodium salt of dibenzyl diethyl diamino-o-chlorotriphenyl carbinol disulfonic acid anhydride	3i
670	Light Green SF Yellowish	Sodium salt of dibenzyldiethyl diamino-triphenyl carbinol tri-sulfonic acid anhydride	4m
671	Erioglaucine	Ammonium salt of dibenzyldiethyl diamino-triphenylcarbinol tri-sulfonic acid anhydride	4j
677	Fuchsine	Mixture of hydrochlorides of para-rosaniline and rosaniline	2j
680	Methyl Violet B	Hydrochlorides of highly methylated pararosanilines	2m
681	Crystal Violet	Hydrochloride of hexamethyl para-rosaniline	2n
684	Methyl Green	Zinc double chloride of hepta-methyl pararosaniline chloride	4l
689	Spirit Blue	Hydrochloride of mixture of phenylated rosaniline and pararosaniline (or acetate or sulfate)	2t
692	Acid Magenta	Mixture of Na or NH^4 salts of di- and tri-sulfonic acids of pararos-aniline and rosaniline	4b
695	Acid Violet 4BN	Example, sodium salt of benzyl-pentamethyl-triaminotriphenyl carbinol trisulfonic acid anhydride	3a
698	Formyl Violet S^4B	Sodium salt of dibenzyl-tetraethyl-triamino-triphenyl-carbinol disul-fonic acid anhydride	3b
704	Alkali Blue	Sodium salt of triphenyltriamino-triphenyl carbinol sulfonic acid	3d
707	Soluble Blue	Comp., sulfonate spirit blue No. 689	10m
712	Patent Blue V	Ca, Mg, or Na salt of disulfonic acid of m-hydroxytetraethyl-diamino-triphenylcarbinol anhy-dride	4g
714	Patent Blue A	Calcium salt of disulfonic acid of m-hydroxy-dibenzyldiethyl diamino-triphenyl carbinol anhy-dride	3e
720	Eriochrome Azurol B	Sodium salt of 2-6-dichloro-hydroxy-dimethyl-fuchson-dicarboxylic acid	6l
724	Rosolic Acid	Aurine is dihydroxy-fuchson	6q
727	Chrome Violet	Sodium salt of dihydroxy-fuchson tricarboxylic acid	6g
729	Victoria Blue B	Hydrochloride of tetramethyl-phenyl-triamino-diphenyl-a-naphthyl-carbinol anhydride	2u
731	Night Blue	Hydrochloride of tetraethyl-p-tolyltriamino-diphenyl-a-naphthyl carbinol anhydride	2p
737	Wool Green S	Sodium salt of tetramethyl-diaminodiphenyl-6-hydroxy-naphthyl carbinol disulfonic acid anhydride	4o
749	Rhodamine B	Tetraethyldiamino-o-carboxy-phenyl-xanthenyl chloride	2k
752	Rhodamine 6G	Ethyl ester of diethyldiamino-o-carboxy-phenyl-xanthenyl chloride	2l
758	Violamine R	Sodium salt of sulfo-di-o-tolyldiamino-o-carboxy phenyl-xanthenyl	3u
766	Uranine	Na or K salt of hydroxy-o-carboxy-phenyl-fluorone	6e
768	Eosine G	Tetrabromofluoresceine	6r
772	Erythrosine Yellowish	Na, K, or NH_4 salt of di-iodofluoresceine	6o
773	Erythrosine Bluish	Na or K salt of tetraiodo-fluoresceine	6t
774	Phloxine B	Potassium salt of tetrabromo-dichloro-fluorescein	6s
777	Rose Bengale	K or Na salt of tetraiodo-dichloro-fluorescein	6u
779	Rose Bengale B	Potassium salt of tetraiodo-tetrachloro-fluorescein	6v
788	Acridine Orange NO	Zinc double chloride of tetra-methyl diaminoacridine	2b
793	Phosphine	Mixture of nitrates of diamino-phenyl acridine compounds	2c
800	Quinoline Yellow S.S.	Quinophthalone	1a
801	Quinoline Yellow	Sodium salts of quinophthalone mono-and di-sulfonic acids	8b
812	Primuline	Mainly sodium salts of mono-sulfonic acids of more highly thionated dehydrothio-p-toluidine derivatives	5a
814	Chloramine Yellow	Formation (example) oxidation of dehydrothio-p-toluidine sulfonic acid with NaOCl	5b
825	Neutral Red	Amino-dimethylamino-toluphenazonium chloride	2i
833	Wool Fast Blue	In general, sulfonic acids of dialkylamino-phenylamino-phenyl-naphthophenazonium chloride	7v
841	Safranine	Mixture of diamino-phenyl-ditolazonium chloride and diamino-o-tolyl-ditolazonium chloride	2h
860	Induline S.S.	Mixtures of amino-, diphenyldi-amino-, triphenyltriamino-, and tetraphenyltetraamino-phenyl-diphenazonium chloride	2q
864	Nigrosine	(Phenazonium derivatives)	2r
865	Nigrosine W.S.	Mixture of sulfonated azine bases or sodium salts	4e
877	Brilliant Cresyl Blue	Example, amino-diethylamino-methyl diphenazoxonium chloride	2s
909	New Blue R	Dimethylamino-naphtho-phenazoxonium chloride	3c
920	Thionine	Diamino-diphenazthionium chloride	2o
922	Methylene Blue	Tetramethyldiamino-diphenazthionium chloride	3f
924	Methylene Green B	Zinc double chloride of tetra-methyl-diamino-nitro-diphenaz-thionium chloride	3g
925	Toluidine Blue	Zinc double chloride of amino-dimethylamino-toluphenazthio-nium chloride	2v
1027	Alizarine VI	1-2-dihydroxyanthraquinone	6a
1034	Alizarine Red S	Sodium salt of 1-2-dihydroxy-anthraquinone-3-sulfonic acid	8f
1053	Alizarine Saphirol S.E.	Sodium salt of 4-8-diamino-1-5 dihydroxy-anthraquinone-2-sulfonic acid	4i
1054	Alizarine Saphirol B	Sodium salt of 4-8-diamino-1-5-dihydroxy-anthraquinone-2-6-disulfonic acid	4h
1073	Alizarin Irisol R	Sodium salt of 1-hydroxy-4-o-sulfo-p-tolylamino-anthraquinone	7w
1075	Alizarine Astrol B	Sodium salt of 1-methylamino-4-o-sulfo-p-tolylamino-anthra-quinone	7y
1075	Alizarine Astrol B (base)	1-methylamino-p-tolylamino-anthraquinone	1n
1078	Alizarine Cyanine Green	Sodium salt of 1-4-di-o-sulfo-p-tolylamino-anthraquinone	8x
1078	Alizarine Cyanine Green (base)	p-Tolylamino anthraquinone	1p
1085	Alizarine Blue Black B	Sodium salt of 3-4 or 2-4-disulfo-phenylamino-1-hydroxy-anthra-quinone	7u
1088	Alizarine Sky Blue B	Sodium salt of 1-amino-2-bromo-4-o-sulfo-p-tolylamino-anthra-quinone	7x
1088	Alizarine Sky Blue B (base)	1-amino-2-bromo-4-p-tolylamino-anthraquinone	1o
1091	Alizarine Rubinol	Sodium salt of 4-o-sulfo-p-tolyl-amino-1-anthra-N-methyl-pyridone	7q
1180	Indigotin IA	Sodium salt of indigotin-5-5-disulfonic acid	10n
1239	Carminic Acid		9e
1242	Azolitmin		8v
Pr.47	Chlorantine Fast Brown BRL		5j
Pr.45	Celliton Red Violet B		1m
Pr.101	Guinea Fast Red BL		10d
	Sunset Yellow		9d
	Ponceau SX		9h
	Brilliant Blue	Same as No. 671	4k
	Fast Green	Hydroxy derivative of No. 670	4n
	Monastral Blue, Soluble		10o

Color Changes of Solutions of Dyes with Hydrochloric Acid and with Sodium Hydroxide

Group 1

Dye		Aqueous Alcoholic Solution	Hydrochloric Acid	Sodium Hydroxide
800	(1a)	Yellow	With large excess, orange	Slightly redder
19	(1b)	Yellow	Red	No change
15	(1c)	Yellow	Orange; with excess, orange-red	No change
17	(1d)	Orange-yellow	Red	Little change
22	(1e)	Orange-yellow	Redder; with excess, red	No change
61	(1f)	Orange-yellow	Redder; with excess, red	No change
44	(1g)	Orange-yellow	Redder, crimson with excess	Violet
24	(1h)	Orange	Orange-red	Orange
73	(1i)	Orange	Redder, crimson with excess	Orange-red
82	(1j)	Red	Slightly redder; with exc., violet	Orange, somewhat duller
248	(1k)	Red	Slightly bluer; with exc., violet	Dull red-violet
258	(1l)	Bluish red	Sl. bluer; with exc., violet-blue	Dull red-violet
Pr.45	(1m)	Violet	With excess, pale brown	Slightly darker
1075b.	(1n)	Blue	Redder; with excess, red	No change
1078b.	(1p)	Blue	Slightly redder	Slightly greener
1088b.	(1o)	Blue	Little change; with exc., pale red	No change

Group 2

Dye		Aqueous Solution	Hydrochloric Acid	Sodium Hydroxide
655	(2a)	Yellow	Yellow	Decolorized
788	(2b)	Orange-yellow	Red	Yellow, green fluorescence
793	(2c)	Orange-yellow	Yellow	Pale yellow
20	(2d)	Orange-yellow	Redder	Yellow, perhaps ppt.
21	(2e)	Orange-yellow	Red	Yellow, perhaps ppt.
331	(2f)	Brown	Redder	Paler
332	(2g)	Brown	Redder	Paler
841	(2h)	Red	Violet; with exc., blue	Red
752	(2i)	Orange-red	Red-orange	Darker
677	(2j)	Red	Darker; with exc., yellow-brown	Very pale red
749	(2k)	Bluish-red	Orange-red	Paler
825	(2l)	Bluish-red	Blue	Orange-yellow
680	(2m)	Violet	Blue; with exc., brown	Brownish-red
681	(2n)	Blue-violet	Blue; with exc., brown	Brownish-red
920	(2o)	Violet	Blue	Reddish-brown, (ppt.)
731	(2p)	Bluish violet	Yellow, pale	Dull red
860	(2q)	Violet-blue (alc.)	No change	Dull violet-red
864	(2r)	Violet-blue (alc.)	Dull blue	Dull violet-red
877	(2s)	Violet-blue	Dull violet	Dull pale red
689	(2t)	Blue (alc.)	Blue; with exc., blue-green	Brown-red
729	(2u)	Blue	Darker; with exc., brown-yellow	Dull red
925	(2v)	Blue	Paler	Dull red, paler
133	(2w)	Blue	Blue	Dull blue
662	(2x)	Green	Brown-yellow	Colorless or pale ppt.
657	(2y)	Bluish-green	Brown-yellow	Colorless

Group 3

Dye		Aqueous Solution	Hydrochloric Acid	Sodium Hydroxide
695	(3a)	Violet	With exc. orange-yellow	Nearly colorless
698	(3b)	Violet	Blue; with exc., yellow	Slightly bluer
909	(3c)	Violet	Violet	Dull olive
704	(3d)	Blue	Blue	Pale brown-red
714	(3e)	Blue	Yellower; with exc., yellow	Dull green
922	(3f)	Blue	Greener and paler	Violet-blue
924	(3g)	Greenish-blue	Little change	Violet-brown
666	(3h)	Green	Brown-yellow with exc.	Slowly decolorized
667	(3i)	Green	Yellower; with exc., yellow	Slightly yellower and paler

Group 4

Dye		Aqueous Solution	Hydrochloric Acid	Sodium Hydroxide
142	(4a)	Orange-yellow	Red	No change
692	(4b)	Bluish-red	Bluish-red	Decolorized
406	(4c)	Violet	Violet-blue	Violet-red
477	(4d)	Violet-blue	Blue	Dull violet-red
865	(4e)	Reddish-blue	Blue	Dull red-violet
520	(4f)	Blue	Slightly paler	Violet-blue
713	(4g)	Blue	Colorless or brown-yellow	Dull blue
1054	(4h)	Blue	Redder	Slightly greener
1053	(4i)	Blue	Redder	Blue
671	(4j)	Greenish-blue	Colorless or brown-yellow	Blue
Br. bl.	(4k)	Blue	Brown-yellow with excess	Blue
684	(4l)	Dull green	Green; with excess, orange	Colorless
670	(4m)	Green	Colorless or brown-yellow	Colorless
Fst. Grn.		Green	Yellow with excess	Blue
737	(4o)	Greenish-blue	Colorless or brown-yellow	Bluer

Group 5

Dye		Aqueous Solution	Hydrochloric Acid *	Sodium Hydroxide
812	(5a)	Yellow	Orange-yellow, ppt.	Yellow, ppt.
814	(5b)	Yellow	Yellow	Yellow
622	(5c)	Orange-yellow	Dull orange-yellow	Orange-yellow
596	(5d)	Orange-yellow	Dull brown	Orange
621	(5e)	Orange	Olive with excess	Orange-red
415	(5f)	Orange	Violet	Orange, duller
420	(5g)	Brown	Dull violet with excess	Red-brown
561	(5h)	Brown	Brown	Brown
598	(5i)	Brown	Brown	Dull brown
Pr.47	(5j)	Brown	Paler (ppt.)	Orange-red
326	(5k)	Orange-red	Dull red	Orange
419	(5l)	Orange-red	Dull red	Orange
448	(5m)	Brownish-red or red	Blue	Red
495	(5n)	Orange-red	Greenish-blue	Dull orange-red

* In medium concentrations all dyes of Group 5 are precipitated by hydrochloric acid.

Group 5 (Cont.)

Dye		Aqueous Solution	Hydrochloric Acid *	Sodium Hydroxide
225	(5o)	Red	Slightly bluer	Red
370	(5p)	Red	Blue	Red
375	(5q)	Red	Violet	Dull red
394	(5r)	Red	Violet	Red
387	(5s)	Violet-red	Violet-red	Slightly darker
539	(5t)	Dark red-violet	Violet-blue	Violet
581	(5u)	Dull violet	Dull violet or brownish	Dull violet
582	(5v)	Dull violet	Dull violet or dull brown	Dull violet
472	(5w)	Bluish-violet	Blue	Dull violet-red
401	(5x)	Dull blue-violet	Dull violet	Violet-red, darker
502	(5y)	Violet-blue	Blue	Violet-red
512	(5z)	Blue	Blue	Blue
593	(5za)	Dull green	Dull blue	Yellowish-green
583	(5zb)	Green	Dull violet	Greenish-black
589	(5zc)	Green	Dull green	Dull dark green
594	(5zd)	Green	Dull green	Dull dark green

* In medium concentrations all dyes of Group 5 are precipitated by hydrochloric acid.

Group 6

Dye		Aqueous Solution	Hydrochloric Acid	Sodium Hydroxide
1027	(6a)	Brownish-yellow	Yellow	Violet
9	(6b)	Yellow	Whitish ppt.	No change
36	(6c)	Yellow	Paler, pale yellow ppt.	Orange
211	(6d)	Red; Na-salt, yellow	Violet-red	Yellow
766	(6e)	Yellow, green fluor.	Yellow	Sl. darker, green fl.
23	(6f)	Yellow	Brownish-yellow	Orange
727	(6g)	Orange-yellow	Orange, ppt.	Orange-yellow
40	(6h)	Orange-yellow	Paler	Red
8	(6i)	Orange-yellow	Nearly decolorized, ppt.	No change
410	(6j)	Brownish-yellow	Brown	Red-orange
480	(6k)	Brownish-yellow	Brown	Red-orange
720	(6l)	Yellow-orange	Orange	Violet-blue
12	(6m)	Yellow-orange	Whitish ppt.	Red-orange
101	(6n)	Orange-brown	Orange-yellow	Orange
772	(6o)	Orange	Yellow-orange, ppt.	No change
431	(6p)	Red	Little change, (ppt.)	Red-orange
724	(6q)	Red	Orange-yellow	Red
768	(6r)	Red, green fluor.	Orange-red (ppt.)	Slightly redder
774	(6s)	Red	Orange	Little change
773	(6t)	Red	Orange	Slightly bluer
777	(6u)	Bluish-red	Orange	Little change
779	(6v)	Bluish-red	Pale pinkish	No change
204	(6w)	Violet-blue	Pale red, or ppt.	Red, paler
299	(6x)	Dull violet	Dull red, paler	Blue-violet

Group 7

Dye		Aqueous Solution	Hydrochloric Acid	Sodium Hydroxide
636	(7a)	Yellow	Yellow	Slightly paler
145	(7b)	Yellow	Violet-red	Dull brown
146	(7c)	Yellow	Violet-red	Dull brown
365	(7d)	Yellow	Darker, blue with excess	Slightly darker
11	(7e)	Brownish-yellow	Much paler with large excess	Red-orange
138	(7f)	Orange-yellow	Red, red-violet with excess	No change
143	(7g)	Orange-yellow	Violet-red	No change
652	(7h)	Yellowish-orange	Dull orange-red with excess	Orange-yellow
26	(7i)	Yellow-orange	Redder	Red-orange
151	(7j)	Orange	Little change; orange-red, excess	Red, duller
161	(7k)	Orange	Redder	Brown
175	(7l)	Brown	Violet	Violet-red
234	(7m)	Brown	Brown	Reddish-brown
165	(7n)	Orange	Redder	Orange
189	(7o)	Red	Bluish-red with excess	Little change
176	(7p)	Red	Red	Duller and darker
1091	(7q)	Bluish-red	Bluer, scarlet with large excess	Little change
202	(7r)	Red-violet	Pale brown with excess	Slightly bluer
289	(7s)	Violet	Blue, green with excess	Dull wine-red
307	(7t)	Dull violet	Green	Little change
1085	(7u)	Violet	Little change	Slightly bluer
833	(7v)	Violet-blue	Reddish-blue	Dull crimson
1073	(7w)	Violet-blue	No change	Blue
1088	(7x)	Blue	Red-violet with excess	Blue
1075	(7y)	Greenish-blue	Red with excess	No change

Group 8

Dye		Aqueous Solution	Hydrochloric Acid	Sodium Hydroxide
7	(8a)	Greenish-yellow	Paler, nearly decol. with excess	Orange-yellow
801	(8b)	Yellow	Yellow	Orange-yellow
364	(8c)	Yellow	Darker, reddish-blue with excess	Orange-red
148	(8d)	Orange-yellow	Orange-yellow	Reddish-brown
150	(8e)	Orange	Redder, red-violet with excess	Red
1034	(8f)	Orange	Yellow	Red-violet
235	(8g)	Brown	Brown	Red
280	(8h)	Orange-red	Darker	Violet
430	(8i)	Orange-red	Darker	Orange, duller
382	(8j)	Scarlet	Brown	Yellowish-brown
80	(8k)	Cherry-red	Little change	Orange-red
278	(8l)	Red	Red, olive with excess	Violet
252	(8m)	Red	Darker, violet-blue with excess	Pale dull violet
130	(8n)	Red	Browner	Little change
182	(8o)	Red	Little change	Brownish-red
88	(8p)	Magenta red	No change	Yellowish-brown
179	(8q)	Magenta red	Red	Browner or scarlet
262	(8r)	Magenta red	Brown, bluish with excess	Red
170	(8s)	Crimson	Bluer	Blue, red with exc.
180	(8t)	Bluish-red	Red	No change
758	(8u)	Bluish-red	Slightly bluer	Cherry-red, darker
1242	(8v)	Violet	Red	Blue
246	(8w)	Blackish-blue	Slightly greener	Slightly greener
1078	(8x)	Bluish-green	No change	Yellowish-green

Group 9

Dye		Aqueous Solution	Hydrochloric Acid	Sodium Hydroxide
10	(9a)	Yellow	Paler, nearly colorless with exc.	No change
639	(9b)	Yellow	No change	No change
27	(9c)	Yellow-orange	Little change	Orange-red
	(9d)	Orange	Slightly redder	Scarlet
1239	(9e)	Orange or orange-red	Little change	Red-violet
216	(9f)	Orange-red	Browner, violet with excess	Brownish-red
79	(9g)	Scarlet	Little change	Orange
	(9h)	Scarlet-red	No change	Orange
29	(9i)	Red	Little change	Duller, bluer
153	(9j)	Bluish-red	Slightly yellower	Slightly bluer
209	(9k)	Violet	Blue	Orange-red
518	(9l)	Blue	Little change	Violet-blue

Group 10

Dye		Aqueous Solution	Hydrochloric Acid	Sodium Hydroxide
16	(10a)	Yellow	Orange or orange-red	No change
620	(10b)	Yellow	Dull yellow	Orange
640	(10c)	Yellow	No change	No change
Pr.101	(10d)	Orange-red or red	Violet-red, dull violet with exc.	Crimson
185	(10e)	Scarlet-red	No change	Dull brown, paler
31	(10f)	Red	No change	Dull pale orange
30	(10g)	Magenta red	Yellower	Orange-red
57	(10h)	Crimson	No change	Dull pale orange
154	(10i)	Magenta red	No change	Brownish-red
56	(10j)	Bluish red	No change	Dull red-orange
53	(10k)	Violet	Orange-red	Dull orange
208	(10l)	Violet	Greenish-blue	Orange-red, paler
707	(10m)	Blue	Blue	Violet-red
1180	(10n)	Blue	Blue	Yellow-green
	(10o)	Blue	With excess green	No change
	(10p)	Yellowish-green	Yellow, dye destroyed	No change

Color Changes of Solutions of Dyes with Sodium Hydrosulfite, Colors of Solutions of Dyes in Concentrated Sulfuric Acid, and Color Changes of the Sulfuric Acid Solutions on Addition of Divanadyl Trisulfate

Dye		Color Changes With Sodium Hydrosulfite	Sulfuric Acid Solution	Sulfuric Acid Solution and Divanadyl Trisulfate
800	(1a)	No change	Brown-yellow	Brown-yellow
19	(1b)	Dec.	Yellow	Green, changing slowly to yellow
15	(1c)	Dec.	Brownish-yellow	As for No. 19 (1b)
17	(1d)	Dec.	Brown-yellow	
22	(1e)	Dec. (slowly)	Blue-violet	Orange
61	(1f)	Dec. (slowly)	Blue-violet	Orange
44	(1g)	Dec.	Crimson	Orange-yellow
24	(1h)	Dec.	Red	
73	(1i)	Dec. (slowly)	Crimson	Brownish-yellow
82	(1j)	Dec.	Violet-blue	Dark brown
248	(1k)	Dec.	Dark green	Orange
258	(1l)	Dec.	Green	Orange-red
Pr.45	(1m)	Not dec. (browner)	Yellow-brown	Slighter darker
1088b	(1o)	Not dec.	Pale dull blue	Intense green-blue
1075	(1n)	Dec. (slowly)	Pale dull blue	Deep blue
1078b	(1p)	Paler	Dull violet-blue	Pale green
655	(2a)	Not dec.	Colorless	Yellow
788	(2b)	Not dec.	Pale yellow, gr. fluores.	Yellow
793	(2c)	No change	Orange-yellow	Dark brown
20	(2d)	Dec.	Brown-yellow	Bluish-green fading quickly
21	(2e)	Dec.	Brown-yellow	
331	(2f)	Nearly dec.	Orange-brown	Dull pale brown
332	(2g)	Nearly dec.	Orange-brown	
841	(2h)	Dec., res.	Green	Dull green
752	(2i)	Not dec.	Yellowish-brown	
677	(2j)	Dec., res.	Brown-yellow	Brown
749	(2k)	Not dec.	Yellow	Dark brown
825	(2l)	Dec., res.	Green	Dull dark yellow
680	(2m)	Dec., res.	Orange-yellow	Olive
681	(2n)	Dec., res.	Orange-yellow	Brown
920	(2o)	Dec., sl. res.	Grass green	Grass green
731	(2p)	Dec., res.	Brown	Dark brown
860	(2q)	Dec., res.	Violet-blue	Dull green, not rapidly attacked
864	(2r)	Partially dec.	Dull greenish-blue	Very dull blue
877	(2s)	Dec., res. imperf.	Dark green	
689	(2t)	Dec., res.	Brown	Blackish-blue
729	(2u)	Dec., res.	Brown	Dark brown
925	(2v)	Dec., res.	Green	Dull red
133	(2w)	Red, then nearly dec., res. red	Grass green	Yellow-green
662	(2x)	Dec., res.	Orange-yellow	Orange
657	(2y)	Dec., res.	Orange-yellow	Orange-yellow
695	(3a)	Dec., res.	Blue	Green
698	(3b)	Dec., res.	Yellow	Dull brown
909	(3c)	Dec., res.	Blue	Green
704	(3d)	Not readily dec.	Brown	Dark brown
714	(3e)	Paler, res.	Yellow	Yellow
922	(3f)	Dec., res.	Yellowish-green	Crimson
924	(3g)	Dec., res.	Dark green	Dark green-yellow
666	(3h)	Paler, res.	Brown-yellow	Brown
667	(3i)	Dec., res.	Orange-yellow	Orange-yellow
142	(4a)	Dec.	Orange-red	Yellow
692	(4b)	Dec., res.	Orange-yellow	Orange-yellow
406	(4c)	Dec.	Blue	Dark brown
477	(4d)	Redder, then dec.	Blue	Brown-yellow
865	(4e)	Pale olive. Res.	Dark blue	Yellowish-black
520	(4f)	Redder, then dec.	Blue	Orange-yellow
712	(4g)	Dec., res.	Yellow	
1054	(4h)	Red. Not res.	Brown-yellow	Blue
1053	(4i)	Orange. Not res.	Dull green-yellow	Blue
671	(4j)	Partially dec.	Brownish-yellow	Brownish-yellow
671	(4k)	As above	As above	As above
684	(4l)	Dec., res.	Orange-yellow	Orange-yellow
670	(4m)	Partially dec., res.	Orange-yellow	Orange
	(4n)	Not dec.	Brown	Brown

Dye		Color Changes With Sodium Hydrosulfite	Sulfuric Acid Solution	Sulfuric Acid Solution and Divanadyl Trisulfate
737	(4o)	Nearly dec., res., imperfectly	Yellowish-brown	Dark Brown
812	(5a)	No change	Pale yellowish, green fluores.	Little change
814	(5b)	Dull greenish	Orange	Orange
622	(5c)	Much paler	Wine-red	Orange-yellow
596	(5d)	(ppt.)	Violet-blue	Yellow
621	(5e)	Paler	Bluish-red	Yellow
415	(5f)	Dec.	Violet-blue	Brown-yellow
420	(5g)	Dull red, then dec.	Violet	Brown
561	(5h)	Dec.	Violet	Brown-yellow
598	(5i)	Dec.	Dull red-violet	Blackish
Pr.47	(5j)	Dec., slowly	Violet-red	Yellow
326	(5k)	Dec.	Violet-red	Brown
419	(5l)	Dec.	Dark blue	Brownish-yellow
448	(5m)	Browner, then dec.	Blue	Orange-yellow
495	(5n)	Dec.	Blue	Olive
225	(5o)	Dec.	Crimson	Yellow
370	(5p)	Dec.	Blue	Green
375	(5q)	Darker, then dec.	Blue	Yellow
394	(5r)	Dec.	Greenish-blue	Brownish-yellow
387	(5s)	Almost dec.	Blue	Orange
539	(5t)	Brown, then dec.	Deep blue	Orange-brown
581	(5u)	Dull red brown, then dec.	Violet or black	Brownish-yellow
582	(5v)	Dec.	Dark violet-blue	Brownish-yellow
472	(5w)	Dec.	Blue	Olive-yellow
401	(5x)	Dec.	Blue	Dark brown
502	(5y)	Dec.	Blue	Orange-brown
512	(5z)	Dec.	Blue	Brown
593	(5za)	Dec.	Dark violet-blue	Orange-brown
583	(5zb)	Dull violet, then dec.	Dull reddish-blue	Yellow
589	(5zc)	Dec., slowly	Dark violet	Brownish-yellow
594	(5zd)	Dec.	Dark violet	Brownish-yellow
1027	(6a)	Paler, res.	Orange-brown	Orange-brown
9	(6b)	Orange, then dec.	Yellow	Greenish-yellow
36	(6c)	Dec.	Yellow	Darker, then yellow
211	(6d)	Dec.	Brown-yellow	Blue-green, gradually fading
766	(6e)	Paler, res.	Yellow	Yellow-green
23	(6f)	Dec.	Orange	
723	(6g)	Dec., res.	Red-orange	Brown
40	(6h)	Dec.	Yellow	
8	(6i)	Dec.	Yellow	
410	(6j)	Dec.	Red-violet	
480	(6k)	Dec.	Red-violet	
720	(6l)	Redder, then dec. Res.	Red	Orange
612	(6m)	Red, then dec.	Yellow	Yellow
101	(6n)	Dull red, then dec.	Orange-red	Yellow
772	(6o)	Paler, partially res.	Orange-yellow	Dark brown
431	(6p)	Ppted., very slowly dec.	Dark red	Orange-yellow
724	(6q)	Dec., res.	Brownish-yellow	
768	(6r)	Paler with exc.	Yellow	Brown
774	(6s)	Paler, partially res.	Brownish-yellow	
773	(6t)	Partially dec., partially res.	Orange-yellow	Dark brown
777	(6u)	Paler, partially res.	Brownish-yellow	
779	(6v)	Paler, partially res.	Orange	Olive
204	(6w)	Red, then pale brown	Blue	Dull yellow
299	(6x)	Dec.	Dark green	Brown
636	(7a)	Dec.	Yellow	Yellow
145	(7b)	Dec.	Violet-red	
146	(7c)	Dec.	Red	
365	(7d)	Dec.	Violet	Orange-yellow
11	(7e)	Orange, then paler	Brownish-yellow	Violet
138	(7f)	Dec.	Violet	Blackish
143	(7g)	Dec.	Violet	
652	(7h)	Pale dull red with excess	Crimson	Greenish-yellow
26	(7i)	Dec.	Orange	Brownish-yellow
151	(7j)	Dec.	Bluish-red	Orange-yellow
161	(7k)	Dec.	Red	
175	(7l)	Dec.	Blue	
234	(7m)	Dec.	Brown	
165	(7n)	Dec.	Violet-red	Orange
189	(7o)	Dec.	Violet	Orange-yellow
176	(7p)	Dec.	Violet	
1091	(7q)	Little change	Bluish-red	Yellow
202	(7r)	Dec.	Blue	Dark brown
289	(7s)	Sl. redder, then dec.	Dull dark green	Dull brown-yellow
307	(7t)	Dec.	Bluish-black	Black
1085	(7u)	Pale br. red. Res.	Dark violet	Yellowish-black
833	(7v)	Dec., quickly becoming carmine red which is not further changed by air or more hydrosulphite	Green	Violet-black
1073	(7w)	Slowly changed to yellow. Partially res.	Dull violet-blue	Brown
1088	(7x)	Orange-yellow, slowly	Blue	Dull blue
1075	(7y)	Orange-yellow, slowly	Blue	Violet
7	(8a)	Dec.	Colorless	Yellow
801	(8b)	Not changed	Orange-red	
364	(8c)	Dec.	Violet-red	Orange-yellow
148	(8d)	Dec.	Yellow	
150	(8e)	Dec.	Red-violet	Orange
1034	(8f)	Little change in acid solution	Orange	Orange
235	(8g)	Dec.	Violet	
280	(8h)	Dec.	Green	
430	(8i)	Paler	Blue-violet	Brown
382	(8j)	Dec.	Violet	Brownish-yellow
80	(8k)	Dec.	Crimson	Brown-yellow
278	(8l)	Neutral solution, red-violet, fading to pale brown	Greenish-blue	Pale orange-red
252	(8m)	Sl. darker, then dec.	Red-violet	Orange-yellow
130	(8n)	Dec., slowly	Bluish-red	
182	(8o)	Dec.	Violet-red	Orange-yellow
88	(8p)	Dec.	Blue	
179	(8q)	Dec.	Violet	Brownish-yellow
262	(8r)	Bluer, then dec.	Violet-blue	
170	(8s)	Dec.	Dark olive	Brown
180	(8t)	Dec.	Blue-violet	Yellow
758	(8u)	Not changed	Orange-red	Yellowish-black
1242	(8v)	Nearly dec., res.	Violet	
246	(8w)	Red, then dec.	Dark bluish-green	Orange
1078	(8x)	Yellow (slowly). Res.	Dark green	Dark green
10	(9a)	Dec. (in alk. solution red)	Pale yellow	Yellow
639	(9b)	Dec., slowly	Yellow	Yellow or orange-yellow

Dye		Color Changes With Sodium Hydrosulfite	Sulfuric Acid Solution	Sulfuric Acid Solution and Divanadyl Trisulfate
27	(9c)	Dec.	Orange	Brownish-yellow
	(9d)	Dec.	Orange	
1239	(9e)	Not dec.	Red	Dark yellow
216	(9f)	Dec.	Orange-red	Brownish-yellow
79	(9g)	Dec.	Crimson	Brownish-yellow
	(9h)	Dec.	Cherry-red	
29	(9i)	Dec.	Violet-red	
153	(9j)	Dec.	Violet	
209	(9k)	Dec.	Dark blue	Reddish-brown
518	(9l)	Violet-red then dec.	Blue	Brown
16	(10a)	Dec.	Yellow	Yellow
620	(10b)	Not dec.	Reddish-brown	
640	(10c)	Dec., rather slowly	Yellow	Yellow
Pr.101	(10d)	Dec.	Brownish-red	Brownish-orange
185	(10e)	Dec.	Crimson	Orange-yellow
31	(10f)	Dec.	Red	Orange
30	(10g)	Dec.	Red	
57	(10h)	Dec.	Red	Orange-yellow
184	(10i)	Dec.	Violet	Orange-yellow
56	(10j)	Dec.	Red	Orange
53	(10k)	Dec.	Violet-red	Yellow
208	(10l)	Dec.	Blackish-green	Blackish-orange
707	(10m)	Paler. Res., partially	Orange-red	Dark olive
1180	(10n)	Dec., res.	Brown	Yellow
	(10o)	Dull red-brown. Res.	Green-yellow	
5	(10p)	Dec.	Brown	Violet-black

Colors of Vat Dye Solutions in Concentrated Sulfuric Acid, and Color Changes of these Solutions with Divanadyl Trisulfate, added as described

Dye		Sulfuric Acid Solution	Sulfuric Acid Solution and Divanadyl Trisulfate
1095	Anthra Yellow GC	Yellow	Yellow
1096	Indanthrene Golden Orange G	Deep blue	Dull green-gray
1099	Indanthrene Dark Blue BO	Dull violet	Black
1101	Caledon Jade Green	Wine red	Green, clear
1102	Anthra Green B	Dull violet	Dull green
1104	Indanthrene Brill. Violet RR	Grass green	Dull red-violet
1113	Indanthrene Blue GCD	Olive	Olive
1114	Indanthrene Blue BCS	Pale brown	Pale orange-red
1118	Indanthrene Yellow G	Orange	Orange
1132	Indanthrene Yellow GK	Pale dull orange	Yellow
1150	Indanthrene Olive R	Red brown	Red brown
1151	Indanthrene Brown R	Dull wine color	Dull orange-red
1180	Indigotin IA	Violet-blue	Black, then yellowish brown
1212	Indanthrene Red Violet RH	Pale green	Yellow
1217	Helindone Orange R	Reddish blue	Orange-brown

Book Reviews

Fatty Acids and Their Derivatives

By A. W. Ralston, Ph.D. Assistant Director of Chemical Research and Development Departments of Armour and Company. 986 pages. Format 5⅝ by 8⅝. Price $10.00; from Canadian Agents $12.00. Publisher John Wiley & Sons, Inc., 440 Fourth Ave., New York 1948.

A book upon a subject of vital importance to textile chemists, textile finishers and manufacturers of textile chemical specialties. It comprises a study of the fatty acids—their occurrence in nature, synthesis, physical properties; and the synthesis properties and uses of the fatty acid derivatives.

The book was written because much new information on fatty acids has resulted from the research of the last few years. More is known about the behavior of acid mixtures, the role of polymorphism, the colloidal behavior of fatty acid derivatives and the structure of acids as revealed by X-rays. The earlier simple concepts of fatty acids are greatly changed. A comprehensive treatise embodying these developments is an imperative need for research workers, teachers and students, and in fact all who deal with fats and oils, detergents and wetting agents. It is believed that this book is the answer to this need.

The book is divided into two sections. Section I describes the synthesis, occurrence in nature and physical characteristics of those acids containing six or more carbon atoms. Preparation of fatty acids from their natural esters, and processes for separating and purifying these acids are included. Section II takes up the major derivatives of fatty acids, their historical background, preparation, and physical and chemical properties. In dealing with the patent literature the author has chosen that material which best illustrates the synthesis and properties of a class of derivatives. The synthetic glycerides are discussed at some length.

The author lists over 5,000 references to guide the reader in his more detailed study of the subjects included within the book.

Many graphs, tables and charts are used to illustrate the text.

Textile Recorder Book of the Year, 1947-48

Published by the Harlequin Press, Manchester, England. Price 21 shillings.

The book is intended as an attempt to provide a comprehensive picture of the present position of the British Textile Industry. It is hoped that the views and opinions of leaders of the various sections will help towards an appreciation of the problems to be faced, and of the factors to be taken into consideration in preparing for the industry's future.

Alongside the views of some of the best known men in the industry will be found

detailed accounts of British textile education facilities, research activity in the various sections of the industry, machinery made available over the past year, and data with regard to the raw material position, the trading position, and financial position.

It is hoped that the comprehensive picture thus presented will be found of value in clarifying the general position and will thus help towards solutions.

Applied Textiles (Raw Materials to Finished Fabrics)

Revised Fourth Edition by Geo. E. Linton and Joseph J. Pizzuto. Format 6 x 9. 384 pages, many illustrations and figures. Price $4.75. Published by Lifetime Editions, Inc., New York.

The authors of this book are both experienced teachers of textiles, and in their introduction they state the book has been written to meet the needs of teachers, home economists, training schools in department stores, students in schools with textile and apparel construction courses and others with an interest in the textile and apparel trades.

The book is divided into four parts each representing one term's work, and each part is divided into approximately 40 units each presumably covering one lesson.

The arrangement of the text is rather unique, in that it does not follow the more or less continuous series of paragraphs, where each is more or less associated with the preceding paragraph, but rather is broken up into somewhat disconnected points to be covered. Take for example the section headed Term 3 —Unit 15, Topic : History of Rayon, these sections follow:

Aim—To teach the History of Rayon.

Motivation—Five fundamental questions regarding rayon.

Development—Twenty numbered paragraphs which cover concise statements regarding the history of rayon.

Application—Seven questions which are for the most part answered in the section headed development.

Testing—Six questions pertaining to the subject.

Materials—List of materials which might well be used in illustrating this unit.

The Future of Rayon Industry in the U. S.—Statistics given regarding the rayon industry capacity and two pages of discussion and two pages of trade names, both domestic and foreign.

At the end of each term coverage there is a series of examination questions: First, 15 of the completion type, Second, 10 True or False, Third, 10 of the multiple choice type, Fourth, 10 matching type questions, and finally, Fifth, 2 of the essay type.

At the end of the book there is an excellent and complete textile bibliography.

This book should prove interesting to all teachers of textiles.

Communism or Capitalism

A twenty-five page pamphlet published by the National Foremen's Institute, Inc., Deep River, Conn. Price 25 cents.

This well illustrated pamphlet brings out in a graphic way the difference between capitalism and communism. It is well worth reading and copies might well be handled to those who have strolled too far toward the left.

The Story of Wool

By Wm. F. Leggett. 304 pages, 5 x 7.5. Chemical Publishing Co. 1947. Price $5.00.

The author has brought together in one volume a vast amount of information concerning the history of wool and other animal fibers from as early as 4200 B.C. down to the present time. Such a book could only have been written after a long study and careful gleaning of facts from all available sources. It provides a historical background for all who are interested in the study of animal fibers from a historical and economic point of view. At the same time they will find the book entertaining reading.

The Rotproofing of Textiles and Related Materials

A survey of Literature by Muriel W. Weatherburn. Textile Section, Division of Chemistry. 184 pages. Published by the National Research Council of Canada.

This summary of literature in the field of rotproofing was prepared in connection with work being carried out in the Textile Section, Division of Chemistry of the National Research Council of Canada. It has been published because the Council felt that many of the literature summaries in this field which have appeared in the past few years have failed to include many of the more important details of the various studies reported, e.g., the concentrations in which the compounds were used, the physical characteristics of the materials to which the compounds were applied and the test procedures on which the evaluation of the compounds were based. In the present report which has been prepared with a view to its possible interest to the textile industry, an attempt has been made to supply these details wherever possible, and particular attention is given to the comparative data for various treatments obtained under identical test conditions, such data being tabulated at the end of the report. The compounds which have been tested for antiseptic or for rot resisting properties whether or not they demonstrate such ability are classified under the general headings of Inorganic Compounds, Metal-organic Compounds, Organic Compounds, Natural Products, and Mixtures of Compounds, with the organic section divided into arbitrary divisions of phenolic compounds, nitrogen-containing compounds, and dyes. A complete classified list of the compounds referred to in this survey is given in Appendix A. A manufacturers list of rot-proofing compounds has been compiled from data on file in the Textile Section of the National Research Council of Canada at Ottawa, and is given in Appendix B. The book closes with a Bibliography of 383 items.

Wool Wax

By D.T.C. Gillespie, M. Sc. Australian Council for Scientific and Industrial Research. 96 pages, pocket size, stiff paper cover. Price $5.00. Published by Hobart Publishing Co., Washington 15, D. C. 1948.

This book, a monograph, presents with remarkable completeness a subject which, in the literature has been unusually scanty on the properties and composition of wool wax, lanolin, cholesterol, and the many derivatives and uses of the by-product of sheep's fleece.

Wool wax will prove of considerable interest to wool processors, the textile industry, pharmaceutical, cosmetic and soap manufacturers, designers of wool wax processing machinery, the leather and paint industries, and those chemists who now or soon will be doing research in this field.

Not the least important section of the book is devoted to a listing of 422 literature references, perhaps the most comprehensive compilation on this subject ever made.

The Chemical Formulary, Volume VIII

H. Bennett, Editor-in-Chief. Format 5½ x 8½, 448 pages. Price $7.00. Published by the Chemical Publishing Co., Brooklyn, N Y. 1948.

This volume, the eighth in the series will be welcomed as it contains thousands of additional, new, practical, and tested formulas, some of which have never before been published.

This book will bring you a great fund of ideas, information, data and formulae that would otherwise be accessible only after consulting many books.

It will keep you abreast of the latest

developments and trends which affect all business and industry. Whatever your manufacturing products may be you are sure to be helped through this series of books.

An Introduction to Color

By Ralph M. Evans, head of Color Control Department, Eastman Kodak Company. Format 7¼ x 9½. 339 pages, 15 colored plates, and 288 figures. Price $6.00. Published by John Wiley and Sons, Inc., New York City. 1948.

Color is a subject which involves so many people with such different attitudes and intentions that a book useful to all of them is quite difficult to write. According to the preface there is first the difficulty of a consistent, understandable terminology. This the author has met by the use of words in their common speech meanings, with a minimum number of words defined and used. A second difficulty lies in the exceeding broad background in the sciences and arts which is required if color is to be grasped in toto. Color sprawls across the three enormous subjects of physics, physiology and psychology. In the past it has been rare that any intensive worker has had the opportunity of understanding all three phases. It is to fill this gap that the book has been written. Each phase of the subject has been developed separately and then the three have been interwoven at the end.

Mr. Evans has written a completely non-mathematical text. Further he does not presuppose the reader to have a knowledge of either physics or psychology beyond the first principles. The book however cannot be considered as elementary in its nature as all necessary concepts have been introduced regardless of their difficulty.

The reader will surely find this book different from any other that has been written upon the subject of color and it will not only prove instructive but extremely interesting.

Textile Science

An Introductory Manual by J. T. Marsh, M. Sc., F.R.I.C., F.T.I. 388 pages, 115 figures. 9 x 5.5 format. Published by Chapman & Hall, Ltd., London. Price 32 s. 1948.

The author has brought together in one compact volume the fundamentals of science as applied in the textile industry. It is to some extent a condensation of several other books by the same author, and constitutes an introductory manual, particularly suited for textile students, and those more advanced in the industry who wish to get a broader view of the scientific aspects of their every day work.

The book is divided into four sections, Part I, Textile Fibers, 81 pages; Part II, Yarns and Fabrics, 67 pages; Part III, Bleaching, Dyeing, and Printing, 130 pages; Part IV, Finishing, 100 pages; followed by a comprehensive bibliography of the more important books upon various phases of the textile industry.

As the author states in the preface, no attempt has been made to compile an encyclopedial work covering every section of an immense subject, or to deal with the technology of the industry in any detail but rather to present the account of the manipulation of the fibers as a connecting link between their fundamental properties and their physical treatment in fabric form.

The book is well up to date in the recent development of such subjects as permanent set or production of non-shrink textile fabrics, the application of resins, rubberizing fabrics, rendering fabrics water resistant or repellent; mothproofing, fireproofing and mildew and rot proofing.

ABSTRACTS

Precision Finishing Needed for Striped Knit Goods

Irving Teplitz, Textile World, page 139, Vol. 98, No. 9, September, 1948.

The customary horizontal spreader used in finishing circular knit goods creates a bow as a result of the pressure of friction at the edges and a lack of friction in the center of the cloth. Although a second run on the finishing calendar in an opposite direction will remove the bow it does not necessarily make perfect horizontal stripes.

Several methods for correcting the bow effect are described and included vertical finishing over a long pipe, as well as the use of rotating rubber wheels on a calendar to overcome the frictional effect of the horizontal spreader.

Dyeing Uncarbonized Woolen Seams Rags

The Dyer and Textile Printer, page 133, Vol. C, No. 3, July 30, 1948.

In order to obtain efficient penetration of woolen rag stocks it is often necessary to decolorize the material prior to redyeing. Dyeing should take place in two-way circulation dyeing machines. However, single-way circulation machines may be readily adapted by the installation of a swivel arrangement to insure movement of the rags.

Direct cotton dyestuffs suitable for after-treatment with bichrome, chromium acetate, or formaldehyde are frequently used as are some neutral acid colors for improving the fastness to milling.

Procedures for accurately sampling batches of dyed rags are given.

Non-Shrink Treatments for Wool

A. J. Hall, Textile Mercury and Argus, page 14, Vol. CXIX, No. 3099, July 9, 1948.

The Wolsey-Stevenson Process for the non-shrink treatment of wool consists primarily of activation of wool with an oxidizing or reducing agent followed by a treatment with active chlorine to accomplish a fiber modification in which the wool is made non-felting and therefore unshrinkable. The preliminary activation of the wool facilitates and allows a more uniform and less drastic chlorine treatment.

Treatments based upon this principle and using potassium permanganate or stannous chloride for the activation and hypochlorite or nitrogen-chloro compounds as the source of chlorine are described in detail.

Cellulose Studies. X. Heterogeneous Degradation of Cellulose and Viscose Rayon in Organic Acid Solutions

P. C. Mehta and Eugene Pacsu, Textile Research Journal, page 387, Vol. XVIII, No. 7, July, 1948.

The heterogeneous hydrolysis of surgical cotton and viscose rayon has been studied using (1) a mixture of 10 percent acetic acid and 10 percent sodium chloride; (2) 10 percent lactic acid and (3) 1 N hydrochloric acid at 60° C. on viscose rayon only.

It was found that hydrolysis ended when the D.P. reached approximately 250 in the case of the cotton and about 60 for viscose rayon. These results are in agreement with the theory that there are in cellulose, units of about 260 glucose anhydride residues linked through 1, 4-β-glycosidic bonds with the units in turn being connected by hemiacetal or acetal bonds.

The entropy change, calculated from Eyring's equation for absolute reaction rates, is negative whereas entropy values calculated from the random hydrolysis of cellulose, starch, methyl glycosides, etc., are positive. It is thought that this may be of significance in the actual mechanism of the heterogeneous acid degradation as against homogeneous degradation.

Experimental procedures are given in detail and test results presented in the form of tables and curves.

Silicones, New Hydrophobic Materials Useful in the Textile Industry

F. L. Dennett, Papers of the American Association of Textile Technologists, page 145, Vol. 3, No. 3, June, 1948.

Silicones are polymers built upon the silicon-oxygen-silicon structure found in inorganic materials such as quartz, glass and the mineral silicates, however containing one or more organic groups attached to the silicon atoms. The silicones commercially available are comprised of 80 products which range in form from resins, greases and fluids, to rubbers.

The silicone resins find applications in the electrical insulation field as well as vehicles for heat and weather resistant paints. The rubber types are used for coatings and impregnants with the end use as high temperature gasketing material or oven conveyor belts and valve diaphragms.

Of the liquid silicones one appears to be an economical antifoam agent for aqueous solutions while another, called, DC1107, shows promise as a durable water repellent.

Although DC1107 is still under investigation, preliminary data indicate that the material, used in the form of an oil-in-water emulsion, may be padded onto textiles with the water repellency developed by drying and heating at 300° F. for 5 minutes. Since the emulsion does not contain harmful acids, alkalies or salts, a final washing is not necessary. The material does not affect the color of fabrics.

A formula for the preparation of a 50 percent master emulsion of DC1107 is given as well as test data obtained on various types of fabrics treated for water repellency with the liquid silicone emulsion.

Degumming Ramie by New Australian Process

W. F. Prehn, Textile Manufacturer, page 304, Vol. 74, No. 883, July, 1948.

The Wise Process, a method for degumming ramie, appears to be a most efficient yet economical procedure for the extraction of ramie fiber. This process, developed by M. M. Wise of Australia, consists of subjecting the ramie to steam under pressure and then crushing the dried stems to remove the woody substance, leaving a clean, degummed fiber.

This new method, now patented in all countries, has been confirmed by Australian government scientists as enabling a 100 percent fiber recovery without damage or loss in luster or inherent natural qualities. The cost of degumming by this method is very small when compared against the current market price of the fiber.

Final test of the spinning qualities of the ramie fiber, extracted by the Wise Process, are now being conducted in British spinning mills.

Dyeing Heavy Shades On Acetates

"Vigilante", Textile Mercury and Argus, page 311, Vol. CXIX, No. 3100, September 3, 1948.

The dyeing of heavy shades on acetate rayon when it is used as effect threads in mixed fabrics often leads to considerable difficulty since the depth of shade obtainable on acetate rayon depends upon the amount of dye that can be absorbed by the fiber. In order to obtain the depth of shade required the tendency is to add an excess of dye with a subsequent surface deposit on the fiber which results in severe crocking.

Since the depth of shade is limited by the amount of dye the fiber is capable of absorbing it is suggested that the problem be approached from the viewpoint of the designer and that consideration be given to having the rayon thread fairly open in texture, as well as to the use of thicker threads in the textile and the use of coarse fibers in the thread.

Imparting Water-Repellency to Textiles by Chemical Methods: A Review of the Literature

H. A. Schuyten, J. David Reid, J. W. Weaver and John G. Frick, Jr., Textile Research Journal, page 396, Vol. XVIII, No. 7, July, 1948.

This paper presents an extensive review of articles and patents relating to water-repellency achieved by chemical methods as differentiated from those methods involving mechanical coatings, use of waxes, rubber emulsions, etc.

The review of the literature is carried out under ten groups, each characterized by the functional or reacting group of the water-repellent agent. This paper includes the introduction and is concerned with the first two of the ten groups: (I) Acid Halides, Anhydrides, and Other Esterifying Agents, and (II) Quaternary Nitrogen Compounds.

Proper Preparation Prevents Printing Problems

T. N. Patrick, Textile World, page 141, Vol. 98, No. 9, September, 1948.

The uses of six types of preparations as aids in difficult printing operations are discussed.

The properties of oil, tannic acid, naphthol, resist-salt, gum and soap preparations are reviewed and particular application of each type of material is given.

Constitutional Factors in the Production of Artificial Protein Fibers

Sam R. Hoover, Elsie L. Kokes and Robert F. Peterson, Textile Research Journal, page 423, Vol. XVIII, No. 7, July, 1948.

Results of investigations by the Regional Research Laboratories of the Department of Agriculture on the basic chemistry of protein fibers are discussed.

The chemical characteristics of each protein are variable depending upon the length of the polypeptide chain as well as the number of arrangements of the amino acid residues. These factors, in addition to the arrangement of the long chains found in proteins, must be considered in the production of protein fibers.

Publications Abstracted in this Issue

Textile World, McGraw-Hill Publishing Co., 330 West 42nd Street, New York 18, N. Y.

The Dyer and Textile Printer, Heywood & Co., Ltd., Drury House, Russell Street, Drury Lane, London, W.C.2, England.

Textile Mercury and Argus, 41 Spring Garden, Manchester, England.

Textile Research Journal, Textile Research Institute, Inc., 10 East 40th Street, New York 16, N. Y.

Papers of the American Association of Textile Technologists, Fairchild Publications, Inc., 7 East 12th Street, New York 3, N. Y.

Textile Manufacturer, 31 King Street West, Manchester 3, England.

Proceedings of the
American Association of Textile Chemists and Colorists

Copyright, 1948, American Association of Textile Chemists and Colorists

November 1, 1948

National Officers of the Association

President
HENRY F. HERRMANN
General Dyestuff Corp.,
435 Hudson Street, New York 14, N. Y.

Vice-Presidents
C. NORRIS RABOLD
The Erwin Cotton Mills Co.
Cooleemee, North Carolina
JOHN N. DALTON
Pacific Mills, Lawrence, Massachusetts

Treasurer
WILLIAM R. MOORHOUSE
National Aniline Division, Allied Chemical & Dye Corp., 150 Causeway Street, Boston 14, Massachusetts

Secretary
HAROLD C. CHAPIN
Lowell Textile Institute, Lowell, Massachusetts

President Emeritus
LOUIS A. OLNEY
Lowell Textile Institute, Lowell, Massachusetts

Chairman of the Research Committee
J. ROBERT BONNAR
General Dyestuff Corp.,
435 Hudson Street, New York 14, N. Y.

Director of Research
HAROLD W. STIEGLER
Lowell Textile Institute, Lowell, Massachusetts

Councilors

Representing Sections

Rhode Island: GEORGE H. WOOD, JR., HAROLD B. STURTEVANT, RALPH F. CULVER.
Philadelphia: CURT R. BAERINGER, LLOYD O. KOONS, ARTHUR W. ETCHELLS, WALTER F. FANCOURT, 3rd, PERCIVAL THEEL.
New York: GEORGE L. BAXTER, EMMETT J. DRISCOLL, WINN W. CHASE, WILLIAM A. HOLST, JR., FRANCIS S. RICHARDSON, CHARLES W. DORN.
Northern New England: WALTER J. HAMBURGER, DAVID X. KLEIN, C. WENDALL LEVER.
Piedmont: SYDNEY M. CONE, WYSS L. BARKER, LELAND G. ATKINS.
Southeastern: WILLIAM B. GRIFFIN.
South Central: JACK ANDERSON.
Mid-West: ERIC W. CAMP, SAMUEL KLEIN.
Western New England: HAROLD H. TAYLOR.

Past Presidents
ELVIN H. KILLHEFFER, P. J. WOOD, WILLIAM H. CADY, ALBAN EAVENSON, CARL Z. DRAVES, THOMAS R. SMITH, WILLIAM D. APPEL.

Standing Committees of the Council and their Chairmen

Executive Committee on Research
J. ROBERT BONNAR, *Chairman*

Publicity
PAUL J. LUCK, *Chairman*

Conventions
KENNETH H. BARNARD, *Chairman*

Appropriations
WILLIAM R. MOORHOUSE, *Chairman*

Constitution and Bylaws
HAROLD C. CHAPIN, *Chairman*

Membership and Local Sections
C. NORRIS RABOLD, *Chairman*

Corporate Membership
EMMETT J. DRISCOLL, *Chairman*

Publications
LOUIS A OLNEY, *Chairman*

Technical Programs
MILES A. DAHLEN, *Chairman*

Local Sections and their Officers

Northern New England Section

Chairman
GEORGE O. LINBERG
Monsanto Chemical Co., 140 Federal Street, Boston 5, Massachusetts

Secretary
AZEL W. MACK
Dexter Chemical Corp., 581 Boylston St., Boston 16, Massachusetts

Vice-Chairman — FRANK J. O'NEIL
Treasurer — MARTIN H. GURLEY, JR.

Rhode Island Section

Chairman
RAYMOND W. JACOBY
Ciba Company, Inc., 61 Peck Street, Providence 1, Rhode Island

Secretary
EMORY A. RICHARDS
Airedale Worsted Mills, Inc., 1 Main Street, Woonsocket, Rhode Island

Vice-Chairman — ROBERT W. JOERGER
Treasurer — ROBERT R. FARWELL

New York Section

Chairman
CHARLES W. DORN
J. C. Penney Co., 330 West 34th Street, New York 1, N. Y.

Secretary
NORMAN A. JOHNSON
American Dyestuff Reporter, One Madison Ave., New York 10, N. Y.

Vice-Chairman — PAUL J. LUCK
Treasurer — JOHN H. HENNESSEY

Philadelphia Section

Chairman
ARTHUR M. GORDON
Martin Fabrics Corp., Allegheny Ave. and Boudinot St., Philadelphia 34, Pennsylvania

Secretary
THOMAS H. HART
Hart Products Corp., P. O. Box 5020, Philadelphia 11, Pennsylvania

Vice-Chairman — JAMES DIXON
Treasurer — A. E. RAIMO

Piedmont Section

Chairman
JOHN B. NEELY
Burlington Mills, Burlington, North Carolina

Secretary
ROBERT H. SMITH
High Point Chemical Manufacturing Co., North Carolina

Vice-Chairman — PELHAM EUGENE SMITH
Treasurer — EDWIN A. BRIGGS

Members should notify the National Secretary of all address changes

Publication of Technical Papers Presented at Augusta National Convention will start in the Next Issue

South Central Section

Chairman
RAYMOND B. SEYMOUR
Johnson & Johnson, New Brunswick, N. J.

Secretary
HOWARD P. LOVELESS
Crystal Springs Bleachery, Chickamauga, Georgia

Vice-Chairman — J. ALBERT CRUMLEY
Treasurer — CHARLES GORDON

Mid-West Section

Chairman
JOSEPH H. JONES
Phoenix Dye Works, 1963 Southport Ave., Chicago 14, Illinois

Secretary
WILLIAM BOYD, JR.
Ciba Company, Inc., 325 W. Huron St., Chicago 10, Illinois

Vice-Chairman — ELLIOTT MORRILL
Treasurer — EDWARD LARSON

Southeastern Section

Chairman
C. RUSSELL GILL
Southern Sizing Co., P. O. Box 167, Atlanta, Georgia

Secretary
S. JACK DAVIS
Callaway Mills, LaGrange, Georgia

Vice-Chairman — HOWARD M. WADDLE
Treasurer — W. F. CRAYTON

Western New England Section

Chairman
J. EDWARD LYNN
American Cyanamid Company, Stamford, Connecticut

Secretary
EDWARD A. MURRAY
Deering Milliken Research Trust, Havemeyer Place, Greenwich, Connecticut

Vice-Chairman — RAYMOND J. CAREY
Treasurer — ROBERT N. BROWNLEE

Pacific Coast Section

Chairman
FRANK P. BRENNAN
U. S. Testing Company, 766 S. Los Angeles St., Los Angeles 14, California

Secretary
H. A. DE MARAIS
General Dyestuff Corp., 37 Clementina St., San Francisco, California

Vice-Chairman — BENJAMIN O. RACE
Treasurer — SIDNEY SPRINGER

Student Chapters

LOWELL TEXTILE INSTITUTE
NORTH CAROLINA STATE COLLEGE
PHILADELPHIA TEXTILE INSTITUTE
NEW BEDFORD TEXTILE INSTITUTE
GEORGIA SCHOOL OF TECHNOLOGY
CLEMSON COLLEGE
BRADFORD DURFEE TECHNICAL INSTITUTE

In Memoriam*

ALFRED P. HOWES

By LOUIS A. OLNEY

EARLY in the summer of 1920 I received a New York phone call from one who was an entire stranger to me. He told me that he had been publishing a weekly news sheet in the interests of the dye industry for three years and had decided that it would be advisable to change it to a monthly or semi-monthly technical magazine in the interest not only of the dye industry, but of dye users in general. He went on to say that he had been advised to approach me in regard to its editorship. I listened to his story but told him that I was too busy to take on any additional work. He apparently was not satisfied with his telephone approach, and expressed a desire to come to Lowell and talk more intimately with me. I told him that I was about ready to leave to spend the week end at my summer home in Concord, New Hampshire and if he cared to come up there and see me I would be delighted to have him do so, but I warned him that he would be wasting his time.

The next morning he arrived and we spent a very enjoyable day but I still maintained my attitude toward his proposition, and this was still further emphasized by members of my family.

Late in the afternoon I drove him to the train. Meanwhile I had been so impressed by his personality and his intent of purpose that I began to weaken and as we sat in the auto at the railroad station waiting for the train I told him that I would help him out temporarily.

This was my introduction to Alfred Pettis Howes, affectionately known to his intimate friends as "Fritz", and this proved to be the beginning of an intimate friendship and business association which lasted for twenty-eight years.

Although the formation of an organization for Textile Chemists and Colorists had been contemplated for several years, such a project now developed quite rapidly. Many of my early talks with Mr. Howes were upon this subject, several editorials relating to such a project were published in the *Reporter,* and his enthusiasm and energy undoubtedly hastened the formation of the AATCC and he should go down in the history of the Association as a co-founder.

To those who knew him well and they are many he will always be remembered as an ardent supporter of the Association. His numerous gifts, many of which were even unknown to the officers, contributed greatly to its development and success. His efforts to make the *Year Book* a success might well be mentioned for in many instances deficits of considerable proportions were written off and forgotten.

The establishment and endowment of the Association Medal is a notable instance of his generosity. He will always remain prominently in the list of the Association's benefactors.

Toward the employees of the Howes Publishing Company he was unfailingly considerate, genuinely kindly, tolerant and generous to an exceptional degree.

While he did not write a great deal Mr. Howes' literary ability was quite remarkable. When the occasion really demanded he could in a very short itme turn out a finished article or report of unusual clearness and conciseness. His correspondence as many may remember was of an equally high character. He had devoted much time to the study of Spanish and had become a rapid reader and excellent linguist in that language. This latter accomplishment became valuable to him during his extensive travels in Spanish speaking countries.

Cornell University from which he graduated in 1907 was always dear to his heart and his unusual loyalty continued with increasing interest through the many years. His special interest was the Theta Delta Chi Fraternity to which, as an alumnus member, he devoted much time and thought. A few years ago he established and endowed a fund, the income of which goes as a prize each year to the senior voted, by the boys of the fraternity house, as being most outstanding. As an instance of his democratic spirit the award was not to be made to a member of his own fraternity. As chairman of the Rushing Committee for new members he did a vast amount of work during the past spring and summer, even working beyond his strength, but did not quite finish the plans he had laid out for this fall. Many of the men of the Theta Delta Chi think of themselves as one of "Fritz's Boys" as he did so much for them financially and otherwise. Among other fraternity activities he was President of the Theta Delta Chi Press.

Fritz had not enjoyed good health for a number of years. He was one of those unfortunates who seemed to recover from one ailment only to be overtaken with another.

The tragic death of his only son on a bombing expedition from England to Germany, regarding which he was unable to gain very specific information unnerved him for a long time and from this he never did recover. He failed rapidly during the last two months of his life.

Circumstances were such that I was with him as the end came. His last remarks to me were "I have tried to treat everyone right and I have done the best that I could".

Fritz was a lover of classical music and as the end approached he requested that some of his favorite records be played. He was listening to these as he slowly passed away.

* Presented at Thursday Evening Dinner, Augusta National Convention, October 21, 1948.

Resolution In Memory Of Alfred P. Howes, Who Died August 21st. 1948

WHEREAS our distinguished Associate, Alfred P. Howes, has been removed from our midst and called to eternal rest; and

WHEREAS he was one of the prime movers in the formation of this Association; and

WHEREAS his generous help in providing a medium for the publication of the proceedings of the Association has been of inestimable benefit to the Association; and

WHEREAS the establishment of the Olney Medal and endowment of the same by him have made it possible for the Association to recognize and encourage the scientific accomplishments of its membership; and

WHEREAS all his dealings, both with the Association and with its individual members have ever been distinguished by kindness, magnanimity and courtesy, providing an example that is difficult to equal; therefore be it

RESOLVED that the Council of the AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS, in regular meeting assembled, honor the memory of our good friend and benefactor, Alfred P. Howes, and extend sincere condolences to his family; and be it

FURTHER RESOLVED that this resolution be spread in full on the minutes of this meeting and that a copy, signed by the President and Secretary, be sent to the family of our departed friend.

President (Henry F. Herrmann)
Secretary (H. C. Chapin)
AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS
September 24, 1948

Mohawk-Hudson Section

A PRELIMINARY meeting of the proposed Mohawk-Hudson Section was held on Friday evening, September 17th, at Wolfert's Roost Country Club, Albany, New York. One hundred and thirty-two members and guests were present at this meeting. Application for the formation of this new section was presented to the National Council Meeting of the AATCC on September 24th in New York. Organization was approved by the Council and Dr. Jack Epelberg of Cluett, Peabody & Co., Inc., Troy, New York, was appointed Secretary *Pro Tem.*

Dr. Epelberg presided at the September 17th meeting and pointed out that there were a great many persons in the area to be covered by the new section who are potential members of the AATCC and that the present members of the AATCC in the area believed that the purposes of the organization could be more fully carried out by the formation of a separate section to hold meetings in a central location. Dr. Epelberg introduced Kenneth R. Fox, President of Lowell Textile Institute, who acted as toastmaster for the balance of the meeting. Dr. Harold C. Chapin, National Secretary of the AATCC, spoke briefly. A number of letters from national officers of the association, commenting on the formation of the proposed new section, were read.

The technical portion of the evening's program consisted of the presentation of a paper entitled "The Elements of Color and Spectrophotometry" by Edward Rhael of Sandoz Chemical Works, Inc. This paper was illustrated by a number of slides and samples.

The meeting was arranged by a committee consisting of the following persons: David O. Hamer, Jr., Arkansas Company; William Nelson, Ritter Chemical Company; Harvey Gendreau, Sandoz Chemical Works; John Hanlon, Mohawk Carpet Mills; Leonard Lang, Cluett, Peabody & Company; Harold Dahlberg, F. C. Huyck & Sons; Irwin Smith, Surpass Chemical Company; Albert Herrmann, General Aniline Works; and John Thompson, General Electric Company.

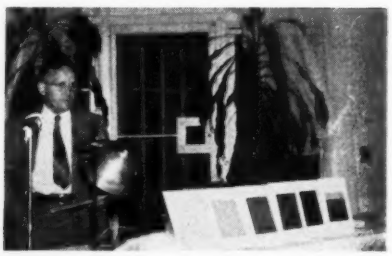
Among those present at the meeting were the following:

Harry B. Ahlward, Surpass Chemical Company, Albany, N. Y.
Ed. Chevrette, Brown Knitting Mills, Warsaw, N. Y.
V. J. Christopher, Mohawk Carpet Mills Inc., Amsterdam, N. Y.
James Cole, High Rock Mills, Philmont, N. Y.
Lowell Christman, Surpass Chemical Company, Albany, N. Y.
W. F. Danner, Skenandoa Rayon Corp., Utica, N. Y.
M. F. Dunbar, Gen. Aniline & Film Corp., Rensselaer, N. Y.
J. C. Donawick, Clark Mills Company, Clark Mills, N. Y.
D. Danuybusky, Elmvale Dye Works, Pittsfield, Mass.
J. F. Gauvon, Cluett, Peabody Company, Troy, N. Y.
Ed. Gore, Clark Mills Company, Clark Mills, N. Y.
A. L. Gewinner, Mohawk Carpet Mills Inc., Amsterdam, N. Y.
Nathan Hatch, Fuld & Hatch Knitting Comp., Cohoes, N. Y.
Theodore Hueyer, Clark Mills, N. Y.
J. J. Halleck, Gen. Aniline Film & Corp., Rensselaer, N. Y.
E. D. Frederici, Mohawk Carpet Mills Inc., Amsterdam, N. Y.
H. L. Dunlap, Palatine Dyeing Company, St. Johnsville, N. Y.
F. R. Davis, Clark Bros. Company, Glen Falls, N. Y.
G. G. Lehmann, Clark Bros. Company, Glen Falls, N. Y.
T. A. Bramfill, Cluett, Peabody & Company, Troy, N. Y.
H. P. Clark, Behr-Manning Corp., Troy, N. Y.
H. G. Thompson, Triangle Finishing Company, Johnstown, N. Y.
G. L. Wallace, Putnam Knitting Company, Cohoes, N. Y.
M. Wemple, Putnam Knitting Company, Cohoes, N. Y.
A. W. Jackson, Putnam Knitting Company, Cohoes, N. Y.
B. Y. Smith, Behr-Manning Corp., Troy, N. Y.
H. J. Leavitt, Cluett, Peabody & Co., Troy, N. Y.
P. Madeiros, Jr., Cluett, Peabody & Co., Troy, N. Y.
U. Cocca, Cluett, Peabody & Co., Troy, N. Y.
G. P. Hahlweg, Ritter Chemical Co., Inc., Amsterdam, N. Y.
R. W. Ritter, Jr., Ritter Chemical Co., Inc., Amsterdam, N. Y.
J. G. Guro
C. E. Brainerd
E. C. Reed, Albany Felt Company, Albany, New York
L. C. Gordon, Albany Felt Company, Albany, N. Y.
J. Spicer, F. C. Huyck & Sons Co., Rensselaer, N. Y.
Hyman Stein, Bennington Mills, Bennington, Vt.
R. Rogenblum, Star Woolen Company, Cohoes, N. Y.
R. Black, Wm. Barnet & Sons Co., Rensselaer, N. Y.
J. M. Alger, Columbian Rope Co., Auburn, N. Y.
G. W. Foxman, Cluett, Peabody & Company, Troy, N. Y.
John W. Merrill, Cluett, Peabody & Company, Troy, N. Y.
Roland Gaviepy, Elmvale Dye Works, Pittsfield, Mass.
E. M. Eddington, Cluett, Peabody & Co., Troy, N. Y.
Donald Reisigl, Mohawk Carpet Mills Inc., Amsterdam, N. Y.
V. J. Lavelle, Berkshire Woolen Mills, Pittsfield, Mass.
Jules Mele, Berkshire Woolen Mills, Pittsfield, Mass.
A. D. Truman, Triangle Finishing Corp., Johnstown, N. Y.
Anthony Visocki, Triangle Finishing Corp., Johnston, N. Y.
David O. Hamer, Jr., Arkansas Company, Inc., Tribes Hill, N. Y.
William A. Nelson, Ritter Chemical Co., Inc., Amsterdam, N. Y.
F. A. Murphy, Cluett, Peabody & Co., Troy, N. Y.
Frank C. Donofrio, Cluett, Peabody & Co., Troy, N. Y.
E. J. Cogovan, Mohawk Carpet Mills Inc., Amsterdam, N. Y.
John J. Hanlon, Mohawk Carpet Mills Inc., Amsterdam, N. Y.
Clayton Shuttleworth, Chalmers Knitting Company, Amsterdam, N. Y.
John M. Nesius, Oneida Bleachery, Inc., N. Y. Mills, N. Y.
Wilfred L. Baute, A. D. Julliard Company, N. Y. Mills, N. Y.
Edward D. Wielicka, Oneida Bleachery, Inc., N. Y. Mills, N. Y.
Robert G. MacIntyre, Cluett, Peabody & Co., Troy, N. Y.
Howard M. Henge, Gen. Aniline Works, Rensselaer, N. Y.
C. Streck, General Aniline & Film Corp., Rensselaer, N. Y.
Walter Drautz, Glenmont, N. Y.
Norman Johnson, American Dyestuff Reporter, New York City
G. R. Beebe, Columbian Rope Co., Auburn, N. Y.
Warren B. Broadbent, Geigy Company, Inc., Utica, N. Y.
Irwin J. Smith, Surpass Chemical Company, Albany, N. Y.
H. S. Dahlberg, Kenwood Mills, Albany, N. Y.
Edmund J. Levine, Lee Dyeing Company, Johnstown, N. Y.
Albert E. Herman, Jr., Gen. Aniline & Film Corp., Rensselaer, N. Y.
George Aloerin, Cluett, Peabody & Co., Troy, N. Y.
R. I. Peters, Bigelow-Sanford Carpet Co., Amsterdam, N. Y.
E. L. Pfeffer, Jr., Cluett, Peabody & Co., Troy, N. Y.
J. P. Thompson, General Electric Company, Schenectady, N. Y.
A. J. Anderson, Nat'l Aniline Div., Allied Chem. & Dye Corp., Albany, N. Y.
H. J. Nichols, Oneida Bleachery, Utica, N. Y.
Cameron Mackenzie, Calco Chem. Div., American Cyanamid Co., N. Y. C.
Moses L. Harrison, Beaunit Mills, Cohoes, N. Y.
H. C. Donaldson, Jr., Cluett, Peabody & Co., Troy, N. Y.
L. S. Lang, Cluett, Peabody & Co., Troy, N. Y.
Philip Braumfel, High Rock Mills, Philmont, N. Y.
Jack Epelberg, Cluett, Peabody & Co., Troy, N. Y.
Charles J. Mills, F. C. Huyck & Sons, Rensselaer, N. Y.
H. L. Dunlop, Palatine Dyeing Co., St. Johnsville, N. Y.
Hyman Stein, Bennington Mills, Bennington, Vt.
Alfred J. Demers, Behr-Manning Corp., Troy, N. Y.

AMONG THOSE PRESENT AT THE MEETING OF THE MOHAWK HUDSON SECTION ON SEPTEMBER 17TH.

HEAD TABLE AT HUDSON-MOHAWK MEETING: left to right—David Hammer, William Nelson, Norman Johnson, Kenneth Fox, (speaking) Dr. Jack Epelberg, Edward Rhael, Dr. Harold Chapin.

Photos by Ulert Cocca, Cluett, Peabody & Co., Inc.



Edward Rhael of Sandoz Chemical Works, Inc., who presented a paper on "The Elements of Color and Spectrophotometry" at the meeting of the Mohawk-Hudson Section.

John F. Brown, Behr-Manning Corp., Troy, N. Y.
A. G. Tompson, Palatine Dyeing Co., St. Johnsville, N. Y.
Alfred H. Fearn, Duofold, Inc., Mohawk, N. Y.
Raymond E. Pemrick, Cluett, Peabody & Co., Troy, N. Y.
John W. Cunningham, F. C. Huyck & Sons, Rensselaer, N. Y.
John P. Rasmussen, Cluett, Peabody & Co., Troy, N. Y.
John J. Daley, Cluett, Peabody & Co., Troy, N. Y.
Daniel J. Coffey, Cluett, Peabody & Co., Troy, N. Y.
W. M. Kline, Onyx Chemical Company, Gloversville, N. Y.
William Marcellino, Cluett, Peabody & Co., Troy, N. Y.
Floyd J. Szurek, Mohawk Carpet Mills, Inc., Amsterdam, N. Y.
J. R. Wells, Cluett, Peabody & Co., Troy, N. Y.
Whitelaw Wright, Eimer & Amend (Fisher Scientific Co.), Schenectady, N. Y.
Tom Terwilleger, Skenandoa Rayon, Utica, N. Y.
Carson A. Thompson, Mohawk Carpet Mills Inc., Amsterdam, N. Y.
W. R. Jacobson, General Electric Company, Schenectady, N. Y.
Raymond Liddle, Cluett, Peabody & Co., Troy, N. Y.
Edward Luneburg, Mohawk Carpet Mills, Inc., Amsterdam, N. Y.
Richard Tryanna, Mohawk Carpet Mills, Inc., Amsterdam, N. Y.
E. B. Martin, Triangle Finishing Corp., Johnstown, N. Y.
Harold Murphy, General Aniline & Film Corp., Rensselaer, N. Y.
L. M. Miller, Cluett, Peabody & Co., Troy, N. Y.
A. J. Nisbet, Triangle Finishing Corp., Johnstown, N. Y.
C. R. Nettleship, Brown Knitting Co., Warsaw, N. Y.
Raymond Palen, Mohawk Carpet Mills, Inc., Amsterdam, N. Y.
Leonard Porter, Chalmers Knitting Company, Amsterdam, N. Y.
Charles Ware, Cluett, Peabody & Co., Troy, N. Y.
John F. Yerick, H. & F. Binch, Glens Falls, N. Y.
Donald W. Bain, Wilson Brothers, Troy, N. Y.
Jerry Hebert, Elmvale Dye Works, Pittsfield, Mass.
John Hintermaier, Cluett, Peabody & Co., Troy, N. Y.
Michael Donawick, Clark Mills Company, Clark Mills, N. Y.
Victor Krukonis, F. C. Huyck & Sons, Rensselaer, N. Y.
C. Ackerbauer, Consulting Chemist, Johnstown, N. Y.
E. B. Laughlin, Laughlin Textile Mills, Waterford, N. Y.
J. Harry Atikson, Surpass Chemical Co., Albany, N. Y.
J. W. Vollmer, Gen. Aniline & Film Corp., Rensselaer, N. Y.
Walter Kitaj, Cluett, Peabody & Co., Troy, N. Y.
Kenneth Fox, Lowell Textile Institute, Lowell, Mass.
Dr. Harold Chapin, AATCC, Lowell, Mass.
Ed. Rhael, Sandoz Chemical Works, New York City
Harvey Gendrau, Sandoz Chemical Works, Albany, N. Y.
C. H. Schmitt, Sandoz Chemical Works, New York City

SHRINKAGE CONTROL

*A Stretch of the Imagination?**

EDWIN WILKINSON
National Association of Wool Manufacturers

IT IS with considerable concern that I tremble before you, the members of the New York Section of the American Association of Textile Chemists and Colorists, this evening. Here in this room is a collection of technologists every one of whom, I am told, aprpeciates the difference between residual and potential shrinkage. That is, all except me—and, if it's what I'm told it is, I don't think it's correct.

My reason for being here is to give you a few personal observations and my view of the Wool Textile Industry's attitude toward recent developments in shrinkage control. This is a difficult assignment; first, because there is no single attitude but a multitude of attitudes; and, second, because it has become a topic about which there seems to be a great deal of emotion. As a consequence, whatever line one follows he is certain to step on someone's toes. As a matter of fact, I will mark it down as an achievement if I get through this evening with a single friend left.

Rinaldo Lukens, of the Continental Mills in Philadelphia, threw a very sobering thought into the Federal Trade Commission "informal conference" over a year ago when he declared he was tired of hearing the propensity of wool to shrink damned as an evil exclusively. He then went on to point out that many of the traditional products of the industry could not be made without taking advantage of this characteristic.

When the Quartermaster began getting reports of the increased serviceability of socks as a consequence of the shrink resistance treatments there was a natural over-enthusiasm manifested by a stated desire to treat *all* army wool purchases for shrink resistance. A needed curb was applied when one of the Industry Advisers dryly observed, "If you want your jacket of 18-ounce serge to look like a Pullman porter's duck coat—go ahead!"

Somebody evolves a process or material which under certain conditions and on certain products of a certain quality wool under certain wash procedures inhibits the shrinkage tendency. Presto! Wool (universal) is shrinkproof! Rub it! Tub it! Flub it!!!

Gentlemen, if it is wrong to emote privately on questions of this nature, how much worse is it to emote publicly through the medium of trade and consumer press—or other media. It has been my experience that nothing so surely kills a Broadway production as to have it oversold before attending. Nothing, in my opinion, will react more unfavorably against shrink resistant wool than to have the public oversold on its possibilities, and then be disappointed.

As I said, at the outset, there is no single industry attitude but rather a multitude of attitudes, and the attitude that you find in discussing shrinkage control with an individual manufacturer depends largely upon his experience with it. If he is one of the first to have adopted any of the current methods and applied it to specific products coupled with a promotional program, naturally, he thinks he has selected the best method and that it is a boon to the consumer.

On the other hand, if the manufacturer has tried one, two, or more of these processes on an experimental basis, and has not himself been sold to the extent of adopting it for any of his regular lines, his attitude is most likely to be that shrinkage control methods are still in the embryonic stage of development, that they require further refinement and currently offer no real advantage to the consumer.

Then there is a third attitude, that of the mill man who has been disinclined to investigate, for one reason or another, and who now finds that he has been more or less scooped, to use a press term, by his competitors. Here we find possibly the most violent and market attitude Usually he is exceedingly certain of one of three points, or all of them. One, it won't work. Two, if it does work, its effect isn't lasting. Three, it damages the fiber and shortens the life of the fabric. Often, it is safe to say, these conclusions are reached without any investigation or any data to support them.

There is only one attitude that I find common in general among mill men, and I think it is an important attitude; one that in the long run will result in the greatest benefit to the consumer and the industry. This attitude that I refer to is the one that holds caution high in the presentation of the probable effects and benefits of shrink resistance treatment.

In the main, it may be said that these manufacturers regard the various shrink control processes as a means to be employed in the stabilization of yarns and fabrics that are to go into items of "intimate apparel," which by their very nature require repetitive launderings. When I use the term "intimate apparel" for wool textiles, it is much broader in scope than would be the case were we speaking of the ladies apparel field where it is practically limited to undies. Classed as "intimate apparel" would be such items as socks, underwear, shirts and sweaters and athletic gear. There is some question whether sweaters really belong in this group for, as James Stirling of the American Institute of Laundering pointed out at the Federal Trade Commission conference last week, ladies sweaters are frequently laundered not for cleansing purposes but rather to restore—er—shall we say—the quality of definition.

Be that as it may, the point I want to make here is that the items in this list of "intimate apparel" articles are, with the exception of shirts, almost exclusively knit items. Significantly, it was representatives of the knitting industries that told the Federal Trade Commission that they still had a long way to go before they could subscribe to tests, and rules of representation based thereon, which they believed would have any validity. In this field the most optimistic note came from Mr. Roy Cheney of the Underwear Institute. He said they hoped to come up with a test method within two months. I wish them well.

* Presented at meeting, New York Section, September 29, 1948.

You see, I have in fact already, more or less unobtrusively, stepped on toe No. 1. By inference I have intimated that shrinkage resistance in wool products is of primary importance in the field of intimate apparel only. It will doubtless find application or mis-application, depending on *your* point of view, in many other fields because it has a point-of-purchase plus as a consequence of the current notoriety. Shrink resistant wool fabrics will be featured in dresses and skirts, men's leisure and sport wear, particularly slacks and in some instances, no doubt, tropical worsteds and other light weight summer wool goods. In some cases, this added feature will be justifiable but in many others it will be what our advertising associates call a "gimmick." It will be a sales plus, period! There are today many fabrics going into these articles which have been adequately stabilized, without benefit of special treatment, to withstand accepted wool washing procedures but the *articles* made of them are not good washing risks. They are not good risks because of the findings, bindings, paddings or linings that go into them. They are not good risks because even if they are well cleansed we, as a mass, have "lost" the art of pressing and the garment done at home frequently presents a sad appearance. No play on said iron intended.

While on the point of pressing, may I stress that one of the principal virtues of wool fabrics, and one which has contributed no small degree to the successful growth of the ready-to-wear industry in this country, is *thermal plasticity*. More often than otherwise those white chalk marks scratched upon your new suit by the fitter are pressing instructions rather than alterations requiring the needle. They may suggest shrinkage or stretch—with subsequent setting—but in either case this fabric flexibility is important to your satisfaction. Take this flexibility out of the fabric and you either must resort to more custom tailoring to get the styling and fit you desire or modify your conception of what a jacket should look like. And yet, with this flexibility that is desirable in fabrics for men's suits, for example, I dare say there is not one among us that has had a suit shrink out of service under normal care and wear. Please note I exclude the old white flannel trousers we used to wear with blue coats. (Incidentally, *there* is an attractive outfit that could perhaps be reborn by virtue of current control of potential or residual shrinkage.)

If at this point we can agree on three conclusions, I should like to present some of the current problems confronting everyone involved in this question of shrinkage control. The conclusions may be stated:

1. Without relaxation shrinkage and felting shrinkage many traditional wool fabric finishes could not be achieved.
2. Dimensional flexibility is a desirable characteristic in fabrics for many apparel purposes.
3. Shrinkage primarily is a fault in "intimate apparel" items which are subjected to repetitive cleansings.

In the absence of violent disagreement let us proceed to analyze the problem at the various levels starting with our most important consideration, our best customer, the consumer

Consumer

Briefly, it is my opinion that the consumer looks for shrinkage control in the intimate apparel items; that the consumer recognizes that textiles in general require varying techniques of cleansing and pressing and *does not demand* that all textiles be put on a cotton wash basis. This rather reasonable attitude on the part of the consumer is in jeopardy however as a consequence of some of the publicity that has attended the introduction and promotion of some of the shrink resistance processes.

Further, the consumer does not give a fig whether the shrinkage encountered is relaxation shrinkage or felting shrinkage. From the consumer viewpoint shrinkage is shrinkage—and it includes stretch. Let us never be guilty of distinguishing between the two in our representations to the consumer.

Retailer

I suspect, as the easiest course, the retailer would favor universal wool shrinkage control if he doesn't have to pay for it. But whether or not the additional cost is manifest in the price itself I here go on record to warn the retailer that, unless he handles this question alertly and intelligently he is going to pay for it other ways—and plenty. He will be called upon to exercise restraint to an extraordinary degree. For, just as the paratrooper whose parachute failed and who lived miraculously because he landed in a swamp was not content or mollified by a proffered *replacement* of the defective parachute, the consumer will be malcontent if the glowing representations are not realized. The retailer must restrain his copy writers and his sales personnel. It will pay dividends in the long run.

The Consumer Product Manufacturer

Here, gentlemen, we have the man on the spot. If his product is comprised of a variety of items, eternal vigilance is his only chance. If his shrinkage representations infer washability, he must exercise precaution with respect to the dimensional stability, color fastness and permanence of finish not only as respects the principal cloth but all the components as well. It can perhaps be done but certainly not haphazardly. One of the principal obstacles to this endeavor is the absence of adequate tests and the lack of definition of terms.

What is "washable"? Is there but one criterion? Should there be but one criterion? I know what I think, but there are probably too few who agree with me. For what interest it may hold for you I think the consumer who gives the matter any thought at all would break washability into three main parts: (a) rugged, (b) careful, and (c) mild.

Rugged would encompass home and commercial methods with good *hot* water. Notice I don't say X degrees Fahrenheit. It would suggest lots of strong soap, bleach, and plenty of elbow grease real or simulated. Simulated by vertical or horizontal drums, revolving or reciprocating.

Careful would suggest warm water, neutral soap or detergent and less vigorous agitation and for a shorter period perhaps.

Mild would suggest custom washing. Lukewarm water, segregation of like items or individual treatment and gentle handling.

I submit that all of these constitute washing of a sort and that any item cleansable by any one of the three truly is washable. Now, if anyone in this room can devise an accelerated test for these methods as well as a procedure for measuring the shrinkage of shirts, socks, underwear, slacks, snowsuits, and the like—and—find acceptable terms for each such as launderable—washable—tubbable or what have you, just so we speak a common language, the job is done.

You know the Quartermaster and your own committee is making progress here. The QM has just issued a new report. "After consideration of the quantitative effects of the many variables which are inherent in testing shrinkage in wool fabrics" they have a test which they found to be the equivalent of 20 Army mobile launderings. It applies to the 10½ ounce all wool shirting.

Gentlemen, this is careful work—by able technicians. But note the limitations. *It is for 10½ ounce all wool shirting.* A fabric made to specifications as precise as any we work with and its launderability is correlated to a definitely specified laundering procedure and a definite number of such launderings.

Need I go further in delineation of the problem as it relates to countless woven,

knit, felted consumer items of extremely varying weights?

The Textile Manufacturer

Here is the man on whom the challenge falls, with whom the successful application of shrinkage control rests. Several have already risen to the occasion. They have in some cases improved the procedure of application of the shrink control process so as to achieve better results than the purveyor of the process or product anticipated. They have redesigned certain fabrics to increase their suitability for specific purposes in light of this added quality—inhibited shrinkage. It has been exciting exploration, and they are now looking toward reaping their just reward. It is important to them that shrink control does not become discredited. They have invested substantial sums in control apparatus and in the development of methods. May I remind you, gentlemen, that *the current shrinkage processes require a degree of control that is far more critical than those to which the wool textile industry has been accustomed.*

It is incumbent upon the textile producer to work closely with his customers who make the consumer article, for the two-edged sword of shrinkage is of paramount importance in this relationship. I refer, of course, to relaxation shrinkage and felting shrinkage. If representations are to be made both shrinkages must be considered by the fabric manufacturer and the cutter and the material must be handled accordingly.

By the same token the yarn spinner producing a shrink treated yarn must maintain the closest liaison with his customer if the true benefits of treatment are to be realized. The collateral benefits which accrue from such close cooperative work are obvious.

Cooperative work of this nature has a tendency to cement and prolong the relationship. Your customer list becomes less fickle, less subject to the suasion of a 2½ cent price advantage, less subject to shrinkage.

This need for close liaison between the textile producer and the manufacturer of the consumer article is the block over which I stumble when I consider the hand knitting yarn spinners' problem of realizing full benefit of these developments. Their product goes into so many different items under so many different conditions. Conditions over which they have no control I'm glad it is not my problem.

The Technician

Developments like shrinkage control should be to the textile technician as N.R.A., W.P.B., and O.P.A. were to the legal profession. I hope you acquit yourselves better than the lawyers. Frankly, I feel that it was thrust upon you by your fellow technicians in other fields. I shall not attempt to say whether that is bad or good. But I will say that whether you like it or not—and whether the other fellows like it or not—its pursuit to successful conclusion is pretty much in your hands. Upon you rests the responsibility of raising the level of textile technology. That is not a new assignment—but in this case it does invoke some new conditions. Your art and persuasion in this case must go out beyond the empirical boss dyer, carder, spinner, weaver or finisher. They must be directed as well to your associates in the chemical and allied fields, to the selling agencies and the advertising agencies. Shrinkage control representations must be kept within reasonable bounds or in its haste to advance it will stumble over itself and fall flat on its face. In which case, the textile technician will lose face with his ultimate boss—the consumer.

—♦ ♦—

Meeting, New York Section

THE first meeting of the New York Section for the 1948-49 season was held on Friday evening, September 24th, at Kohler's Swiss Chalet, Rochelle Park, N. J. An informal dinner preceded the meeting.

Charles W. Dorn, Chairman, introduced the officers and guests and extended best wishes for success to the new section which is in process of organization in upper New York State.

Emmett J. Driscoll, Chairman of the National Corporate Membership Committee, commented on the new campaign for research funds.

Kenneth H. Barnard, Chairman of the National Convention Committee, referred to the special trains to the Augusta Convention and discussed the program which had been arranged for the convention.

Dr. Harold W. Stiegler, Director of Research for AATCC, discussed the "AATCC Research Program."

Edwin Wilkinson of the National Association of Wool Manufacturers presented a paper entitled: "Shrinkage Control—A Stretch of the Imagination?"

The attendance was approximately 250.

Respectfully submitted,
NORMAN A. JOHNSON
Secretary.

—♦ ♦—

Fall Meeting, Mid-West Section

THE fall meeting of the Mid-West Section was held at the Bismarck Hotel, Chicago, Illinois, on September 25, 1948.

The afternoon meeting was called to order at 2:45 P.M., Elliott Morrill, Vice Chairman, presiding. Seventy-seven members and guests were present. The minutes of the last meeting and outing and the treasurer's report were read and accepted. Leonard Armstrong gave a report on the progress made by his committee on the technical paper being prepared for the intersectional contest. Mr. Morrill then introduced H. Schultz of the Chicago & Eastern Illinois Railroad, who, after the meeting, discussed transportation to the National Convention with those who planned to go. Jos. H. Jones followed with a resume of National Convention news and transportation schedules.

The Nominating Committee, Herman Boxser, Chairman, recommended the following officers for the year 1948-1949. These were elected.

Chairman—Jos. H. Jones.
Vice Chairman—Elliott Morrill.
Treasurer—Edward Larson.
Secretary—William Boyd, Jr.

Sectional Committee

Al. J. Feit.
Lloyd Mandelert.
Arthur I. Hultberg.
Louis W. Blank.

Councilors

Elmer Smith.
Gordon Markle.

The business of the meeting having been completed, a reporter from the Journal of Commerce, through Jos. H. Jones, asked the following question; "Why should there be a difference in the color fastness on staple and filament nylon." This brought various comments and discussion from the floor. The meeting was adjourned at 3:40 P.M.

Dinner was served at 7:15 P.M. and 92 members and guests were present. Immediately following, our Chairman introduced the speaker of the evening. Henry E. Millson of the Calco Chemical Division—American Cyanamid Company, gave a very interesting talk on the "Study of Wool Dyeing" in reference to the "Effect of Metals on Tippy Dyeing". Mr. Millson effectively illustrated his lecture with colored slides.

The meeting was then adjourned at 10:10 P.M.

Respectfully submitted,
William Boyd, Jr., *Secretary.*

—♦ ♦—

Meeting, WNE Section

THE first meeting of the 1948-1949 season of the Western New England Section of AATCC was held September 10, 1948 at the Waverly Inn, Cheshire, Connecticut, H. C. Borghetty of the General

Dyestuff Corporation spoke on the subject of "Auxiliary Products in Dyeing".

Henry F. Herrmann, National President of the AATCC welcomed the group into the organization at this their first meeting of their first full year.

Mr. Borghetty's talk was followed by a lively discussion period. The attendance was 45 members and guests.

In the absence of the secretary, the notes were furnished by Dr. Lynn, chairman of the section.

Respectfully submitted,
E. A. Murray, *Secretary.*

—◆ ◆—

Meeting, Philadelphia Section

THE Philadelphia Section held a meeting on September 24th at Kugler's Restaurant in Philadelphia.

Chairman Gordon paid tribute to Walter Fancourt, 2nd for his long service to the Section and to his many civic activities. He also introduced Fred L. Nuttall, Electric City Dyeing Co., Scranton, Pa. as one of our Charter Members. Rev. Rahn, who is a minister of 4 churches in Kempton Township in rural Berks County of Pennsylvania, was introduced as a guest who spoke with a few minutes of well-chosen wit.

Dr. O. B. Hager, speaking for the International Contest Committee for 1949 announced that Jackson Woodruff of American Viscose Co. had been elected as Chairman of this Committee.

W. O. Neeb speaking for the Membership Committee reported further progress with 788 senior members now in this Section.

Chairman Gordon called for a minute of silence in memory of Edward J. Diamond who recently passed on.

Geo. Altenbaumer of Fred Whitaker Co. exhibited the color motion pictures taken by him at the Section's Outing at the Atlantic City Country Club.

Arthur W. Etchells reported the following candidates for the Section's Officers for 1949 as selected by the Nominating Committee:

Chairman Emeritus—Elmer C. Bertolet.
Chairman—James Dixon.
Vice Chairman—Richard B. Stehle.
Treasurer—A. E. Raimo.
Secretary—Thomas H. Hart.
Councilors—Walter F. Fancourt, 3rd, Lloyd O. Koons, M. H. Klein, O. B. Hager, Fred V. Traut.

The Committee, feeling that the Sectional Committee should consist of membership represeentation, has suggested twelve members outstanding in their work for the Section and leave it to the membership to make their choice by ballot. Those suggested were:

John Barton, Harry Creegan, H. Clapham, E. C. Diehl, J. W. Jordan, John Koch, H. L. Morgan, W. O. Nebb, E. E. Rettberg, Jr., A. H. Seitz, W. R. Smith and Jackson Woodruff.

Nominations from the floor added the name of E. C. Diehl for Vice-Chairman. Mr. Diehl withdrew his name from the candidates for Sectional Committee.

Ballots are to be mailed by the Secretary and will be tabulated before the next Section meeting. Chairman Gordon has appointed E. S. Atkinson, Eric Simmat and Emil Peters as tellers.

The technical session was conducted by M. H. Klein, Chairman of the Program Committee, who introduced the speaker of the evening, M. T. Fleming of Proctor & Schwartz, Inc. who spoke on "Some Practical Aspects in the Drying, Heat Treating and Finishing of Textile Fabrics". A lively discussion period followed this excellent paper.

173 members and guests attended the dinner preceding the meeting while 198 were present at the technical session.

Respectfully submitted,
Thomas H. Hart, *Secretary.*

—◆ ◆—

Membership Applications

SENIOR

Salvatore C. Accardo—Color-Mixer, Paterson Textile Printers, Inc., Paterson, N. J. Sponsors: K. G. Morton, J. E. Loughlin.

Fred L. Anderson—Technical Director, Cia America Fabril, Rio de Janeiro, Brazil. Sponsors: H. E. Hager, J. R. Bonnar

Clarence R. Barton—Asst. Service Mgr., Industrial Rayon Corp., New York, N. Y. Sponsors: H. C. Borghetty, O. F. Marks.

Robert C. Bogle—Supt., American Thread Co., Fall River, Mass. Sponsor: A. H. Judge.

Ross A. Corio—Technical Repres., Carbide & Carbon Chemicals Corp., Newark, N. J. Sponsors: R. A. Gladue, A. Tannenbaum.

M. Czajkowski—Finisher, Supreme Textile Dye & Print, Inc., Long Island City, N. Y. Sponsors: M. L. Blitz, S. J. Nanasy.

John D. D'Alexander—Dyer, Kanmak Mills Inc., Kulpmont, Pa. Sponsors: W. F. Sheriff, W. B. Tucker.

Carl N. Dufvenius—Textile Colorist, Holmens Bruks a. Fabriks AB, Norrkoping, Sweden. Sponsors: S. Arnold, S. Smith.

Julius Flaks—Vice President, Nyanza Laboratories, Inc., Newark, N. J. Sponsors: R. H. Skinner, L. J. Hansen.

Arthur W. Goetz—Director, School of Leather & Tanning Tech., Pratt Inst., Brooklyn, N. Y. Sponsor: D. P. Knowland.

William G. Green—Technical Demonstrator & Sales., General Dyestuff Corp., Charlotte, N. C. Sponsors: R. H. Souther, C. T. Moore.

Jorgen G. Hansen—Asst. Supt. & Vice Pres., A/S De forenede Jyske Farverier og Trikotagefabrikker, Aarhus, Denmark. Sponsors: A. W. Goodwin, R. C. Geering.

Joseph C. Harvey—Chemical Sales, Rumford Chemical Works, Rumford, R. I. Sponsors: I. G. Loxley, A. H. Razee.

Ray G. Kelso—Dist. Sales Mgr., Carbide & Carbon Chemicals Corp., Atlanta, Ga. Sponsors: O. W. Simmons, C. R. Gill.

EMPLOYMENT REGISTER

This column is open for four insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers, who can obtain further information from the Secretary.

48-11

Education: Chemical Engineer, University of Vienna.

Experience: Dyeing and finishing of cotton and synthetic fibers, including application of vats, naphthols and Indigosols, resin finishes, and tricot and tubular goods processing.

Age 45; married, references; U. S. citizen; will go anywhere.

9-20, 10-4, 10-18, 11-1

48-13

Education: PhD, physical chemistry.

Experience: Research chemist and laboratory director; synthesis of finishing materials and detergents; several publications.

Age 38; married.

11-1, 11-15, 11-29, 12-13

CALENDAR

PHILADELPHIA SECTION
Meetings: November 12, January 28, 1949 (Kugler's, Philadelphia).

NORTHERN NEW ENGLAND SECTION
Meeting: November 19.

SOUTHEASTERN SECTION
Meeting: December 4 (Atlanta, Ga.).

WESTERN NEW ENGLAND SECTION
Meetings: December 3, January 14, 1949, February 25, April 8, May 20.

NEW YORK SECTION
Meetings: November 19, January 28, 1949, March 4, April 1, May 6.
Outing: June 17.

TRADE NOTES • NEW PRODUCTS

• Officers of Sun Chemical Corp.

At a special meeting of the Board of Directors of Sun Chemical Corporation, held on September 24, 1948, George W. Ullman was elected president.

At the same meeting A. C. Horn was elected Chairman of Sun's Executive Committee.

William Recht, Vice-President, was elected as a member of the Board of Directors.

A. E. Horn, President of the A. C. Horn Company, Division of Sun Chemical, and Ernest Nathan, President of Warwick Chemical Company Division of Sun, were elected vice-presidents of the Corporation.

Albin K. Schoepf retired and James W. Raynolds resigned.

Ernest Nathan

• Chemical Industry Medal

For his leadership in developing the billion-dollar synthetic aliphatic industry, strategic field of chemical production vital to the national economy, James A. Rafferty, vice-president of the Union Carbide and Carbon Corporation, New York, has been awarded the Chemical Industry Medal for 1948, it is announced by Archie J. Weith, chairman of the American Section of the Society of Chemical Industry.

The medal, conferred annually by the American Section for outstanding application of chemical research to industry, will be presented at a dinner meeting in the Hotel Waldorf-Astoria, New York, on November 5, when leading scientists will pay tribute to Mr. Rafferty both for his peacetime research and for his contributions to the wartime rubber and atomic energy programs.

The rise of the aliphatic branch of chemical industry which was virtually unknown and unexplored thirty years ago, represents one of the most spectacular achievements in the history of chemical science and technology, according to Mr. Weith, who is assistant director of research and development of the Bakelite Corporation, New York.

During World War II, Mr. Rafferty, who is chairman of the board of the Carbide and Carbon Chemicals Corporation and a senior officer of several other Union Carbide affiliates, was executive officer in charge of the extensive operations of Union Carbide in connection with the government's synthetic rubber and atomic energy projects.

Mr. Rafferty was born in Chicago on May 4, 1886, and obtained his elementary education in the Chicago schools. He studied engineering and chemistry at Lewis Institute of Technology, graduating in 1908 with a mechanical engineering degree. He also holds an honorary degree of Doctor of Engineering from the Illinois Institute of Technology.

Following his graduation, Mr. Rafferty was employed by the Peoples Gas, Light, and Coke Company of Chicago. For the next nine years he was engaged in research and operations, becoming plant superintendent and later superintendent of distribution. In 1917, he left the gas company to join The Linde Air Products Company which, later that year, became a unit of the Union Carbide and Carbon Corporation.

Mr. Rafferty became general manager of Carbide & Carbon Chemicals Corp. and took a leading role in sponsoring its pioneering and eventual leadership in the commercial development of synthetic aliphatic chemicals. His success in this association led to his election as a vice-president of Carbide and Carbon Chemicals Corporation in 1924. The following year he was elected a vice-president of The Linde Air Products Company. In 1929, he was made president of Carbide and Carbon Chemicals, and in 1939 he was elected president of the Bakelite Corporation. He became chairman of the board of both the latter companies in 1944.

His activities have extended to many other positions in the Union Carbide and Carbon Corporation. Among his posts today are those of director and chairman of the board of Bakelite Corporation and director of the following units of the parent corporation: United States Vanadium Corporation; Union Carbide and Carbon Research Laboratories, Inc.; The Linde Air Products Company; The Oxweld Railroad Service Company; and the Electro Metallurgical Company. Mr. Rafferty was made vice-president of Union Carbide and Carbon Corporation in 1938, a director in 1941, and member of the corporation's executive committee in 1944.

• Arnold, Hoffman Appointment

The Arnold, Hoffman & Co., Incorporated, has announced the appointment of R. M. Locke (above) as Technical Director of the Dye Department. Mr. Locke is a graduate of Northeastern University and has been associated with the General Aniline and Film Corporation and its various divisions for eleven years. During the past two years, Mr. Locke was Vice-President of the Ross-Smith Corporation, in charge of their photographic printing on fabrics.

Mr. Locke's duties with Arnold, Hoffman & Co., Inc., will be to assist in the co-ordination of the manufacturing operations of the Dye Department with the Export and Domestic sales activities of the Company. In this connection, he will have charge of the newly enlarged technical service facilities which are being developed to meet the greatly increased demand for the Company's rapidly expanding dye production.

• Annual Meeting, TRI

The 19th Annual Meeting of the Textile Research Institute, Inc. will be held at the Waldorf-Astoria Hotel in New York City on November 18th and 19th. The Institute laboratories at Princeton, N. J., will be hosts at "Open House Day" on Saturday, November 20th. The first day has been designated as "Scientific Day" with a program consisting of reports by leading scientists on recent developments in cot-

ton research; physical properties of cellulose acetate fibers and yarns; and the transmission, reflectance, and absorption of near infrared radiation in textile materials. The second day will be "Institute Day" with emphasis placed on fiber and fabric developments, merchandising and the less technical aspects of progress in the textile industry. An important feature of the two-day meeting will be an exhibit and demonstration of some of the most recent developments in laboratory, testing, and control instruments.

Several types of electrical instruments for moisture determination and control will be shown, as well as measuring instruments for accurately determining diameters of fibers and of yarns. The SERC Electron Micrometer will be shown for the first time. This instrument is a non-contact, continuously indicating measuring device for the diameter of textile yarns, fibers, and threads.

Improved types of inclined plane- and pendulum-type tensile testers will be seen, and of special interest will be the new Instron Tensile Tester which incorporates new electronic principles of load weighing and which provides full-scale load ranges from two grams full-scale to one thousand pounds.

A precision instrument for textile testing and research is the Pulse Propagation Meter. In this instrument an acoustic pulse is introduced into the material being tested and its time of propagation is measured between a transmitter and a receiver. By this means the elastic modulus of the material is determined with great simplicity and speed.

Other new instruments on display will include a high-speed microtome for cutting extremely thin sections of textile materials for microscopical examination, a knit fabric shrinkage tester, the Schiefer Abrasion Testing Machine, various optical instruments, and photomicrographic equipment.

Program—Scientific Day—November 18

"Recent Developments in Cotton Research" Dr. Walter M. Scott, Director, Southern Regional Research Laboratory, U. S. Dept. of Agriculture.

"The Effect of Variations in Degree of Structural Order on Some Physical Properties of Cellulose Acetate and Cellulose Acetate Yarns"—Dr. Robert W. Work, Celanese Corporation.

"Transmission, Reflectance, and Absorption of Near Infra-Red Radiation in Textile Materials"—Dr. Richard H. Wilhelm, Princeton University.

Program—Institute Day—November 19

"What New Textiles are Needed"—Theodore Felner, Merchandise Counselor, Macy's, New York.

"Fibers and Fabrics of the Future"—Speaker from *Vogue* Magazine.

"Fibers in New Fabrics"—Pierre Sillam, Formerly Director of Fabric Development, American Viscose Corporation, presently engaged in fiber and fabric development with the Glen Raven Mills.

"Basic Research Benefits Textiles"—Dr. Milton Harris, Harris Research Laboratories.

•Joins Mathieson Chemical

S. L. Nevins (above) has joined Mathieson Chemical Corporation as general manager of the company's newly formed ammonia department, according to an announcement by Thomas S. Nichols, president and chairman of the board.

Mr. Nevins is credited with a number of developments in the manufacture of fertilizer chemicals, served on the sulfuric acid and superphosphate advisory committees for the War Production Board and the Office of Price Administration during World War II, and since then has been serving on the Industry Nitrogen Advisory Committee to the Department of Commerce. He will have headquarters in Mathieson's New York offices and at its Lake Charles, La., ammonia plant.

A native of St. Louis, Mo., Mr. Nevins attended the Missouri School of Mines from which he was graduated with a B.S. in chemical engineering in 1920. The following year was spent with Monsanto Chemical Co. From 1921 until he joined Mathieson he was with the Southern Acid & Sulphur Co., Inc., where he pioneered a number of new developments, including new processes for production of superphosphate and the recovery of sulfur from waste gases. Mr. Nevins was also responsible for the development of the large plant at Houston for production of ammophos and sulfate of ammonia. He is a member of the American Chemical Society, Chemists Club and Chemical Market Research Association.

• Fall Dinner, PTI Alumni

The Annual Fall Dinner of the Philadelphia Textile Institute Alumni Club of New York will be held on the night of Thursday, November 4th in the Della Robbia Room of the Vanderbilt Hotel, it was recently announced by Leon P. Brick, Onyx Oil & Chemical Company, President of the New York Club.

Charles W. Carvin, Charles W. Carvin Company, Incorporated, an alumnus of the Institute '23 and well known to the textile trade in the role of toastmaster and wit, will be the speaker of the evening.

William L. O'Donovan, Sales Manager, Filament Yarn Division, Celanese Corporation of America, will act as Master of Ceremonies.

On behalf of the New York Club, Mr. Brick extends the invitation to attend this Dinner to all its members, alumni of the Institute, and all those associated with the textile industry. The New York Club, reorganized in 1946, now numbers an active membership of more than 150 men. The occasion of their dinner celebration November 4th has particular significance at this time in the light of the commencement of construction of the new Philadelphia Textile Institute, for which ground was broken in Germantown on September 15th and into which the student body of the Institute will move in the Fall of 1949.

Serving with Mr. Brick on the Dinner Committee are: Max Schuster, Cantor, Greenspan Co., Inc., and Edwin Wilkinson, National Association of Wool Manufacturers. Tickets for the Dinner are $5.00 and reservations may be made by writing Mr. Wilkinson at Room 1208, 386 Fourth Avenue, New York 16, New York.

• Carbide and Carbon Appointment

Victor H. Boden has been appointed Eastern Division Sales Manager of Carbide and Carbon Chemicals Corporation. He joined Carbide in 1933 as an Industrial Fellow at the Mellon Institute of Industrial Research in Pittsburgh. Later he became a technical representative for the Company, serving in the New York and New Jersey districts. In 1940 he moved to Philadelphia where he has been District Sales Manager until the time of his new assignment. For the present Mr. Boden will be located at Carbide's Philadelphia office, 1649 North Broad Street.

• Promoted by Interchemical

Interchemical Corporation—Textile Colors Division, Fair Lawn, N. J., announces the appointment of James R. Redmond as New England District Manager, with headquarters at 11 Winthrop Ave., Pawtucket, R. I. Mr. Redmond joined the Textile Colors Division (then Aridye Corporation) in 1945 and for the past two years

has acted as Technical Representative for the New England District.

Following his graduation from Lowell Textile Institute in 1936, Mr. Redmond went with Ciba Company. Subsequently he was connected with the U. S. Army Quartermaster Depot in Jeffersonville, Ind. and the Chemicals Section of the Military Planning Division in Washington. Mr. Redmond is a member of the American Chemical Society, and is Chairman of the Committee Division on Fire Resistant Textiles of the American Association of Textile Chemists and Colorists.

• Calgon Appointment

Owen Rice, former manager of the Calgon Threshold Department, has been elected vice president in charge of commercial chemical sales, Calgon, Inc., Pittsburgh, a subsidiary of Hagan Corporation. Mr. Rice joined a Hagan subsidiary, Hall Laboratories, Inc., in 1937, as a research engineer with the special assignment of developing threshold treatment.

Mr. Rice received his B. S. degree in chemical engineering from the University of Florida in 1931, and his M. S. degree on a graduate fellowship at the same university in the following year.

He is a member of the American Chemical Society, the American Waterworks Association, the American Railway Engineering Association, and the Engineering Society of Western Pennsylvania, and is a registered professional engineer in Pennsylvania.

• Joins Staley

Elliott W. Amon has joined the research staff of A. E. Staley Manufacturing Co., Decatur, Ill., as a junior research chemist, Dr. Paul R. Shildneck, director of research, has announced. Mr. Amon formerly was associated with Peznar Mfg. Co., Mercer, Pa.

• Join Sylvania

William F. McCabe and Donald H. Gilson have joined Sylvania Division American Viscose Corporation as salesmen attached to the New York office.

Mr. McCabe attended St. Peter's College, Jersey City, New Jersey, and came to Sylvania from Seagren Products, Inc., Brooklyn, where he was assistant to the president.

Mr. Gilson attended Syracuse University. Formerly he was associated with Chance-Vought Aircraft Corp., Wall-Rope Works Company, Inc., and Dade Brothers, Inc.

• Advertising Manager, Bocon

Murielle H. North (above) has joined Bocon Chemical Corporation as manager in charge of advertising and public relations. This was announced by Ernest J. Conway, president of Bocon, manufacturers of Boconize, mothproofing compound.

Miss North was formerly associated with Roy S. Durstine, Inc., and, prior to that, was connected with the American Newspaper Advertising Network, Inc.

• Hooker Producing C-56

The Hooker Electrochemical Company, Niagara Falls, New York, announces the production in pilot plant quantities of hexachlorocyclopentadiene or C-56. This new product is a highly reactive chemical and as such should be a very versatile chemical intermediate. The various classes of end products which may be prepared from C-56 include: acids, acid chlorides, acid anhydrides, esters, amides, ketones, diketones, quinones, acetals, nitriles and fluorocarbons. The probable fields for the applications of this new chemical are insecticides, dyes, pharmaceuticals, resins, germicides, and fungicides.

The product is a yellow to amber colored liquid with a pungent odor. It has a molecular weight of 272.79, a boiling point of 236°C, a freezing point of —2°, and a specific gravity of 1.715 at 15.5°C. It has no flash point. More complete physical and chemical information is in Data Sheet No. 371 which is available upon request.

• New Gurley Dealers

W. & L. E. Gurley, Troy, N. Y., manufacturer of engineering and scientific instruments, has appointed three new dealers, it was announced by Lester C. Higbee, General Sales Manager.

In the New York metropolitan area, sale of Gurley instruments will be handled by L. L. Ridgway Company, 324 Lafayette Street, who will open an additional branch office at 277 Broadway for the display of Gurley equipment.

Western Blueprint Company, Kansas City, Missouri, will be the new agent for Kansas and western Missouri, and Wray Williams Company, Memphis, Tenn., will cover Tennessee and Arkansas.

Coincident with the appointment of L. L. Ridgway, Gurley's New York office was discontinued.

W. & L. E. Gurley, founded in 1845, is the oldest manufacturer of engineering and scientific instruments in the United States. Its equipment spans the fields of paper and textile testing, surveying, geodesy, hydrology, meteorology, and standard weights and measures.

OBITUARY

A. L. HAYES

A. L. HAYES, metropolitan New York representative of the Laurel Soap Manufacturing Co., Inc., Philadelphia, for over twenty-six years, died suddenly September 15, at his home in Weehawken, N. J. He was 58. Burial took place Saturday, September 18, in Washington, N. J.

MAX B. KAESCHE

MAX B. KAESCHE, one of the oldest employees of Sandoz Chemical Works, Inc. in point of service, died suddenly at his home, Saturday, October 2nd, at the age of 52. He was with Sandoz since 1919, when Sandoz took over the dyestuff department of his father's firm, F. Bredt & Company.

MAX B. KAESCHE

He served in both World Wars and after the end of World War II, he became Field Sales Supervisor of Sandoz, a position he occupied at the time of his death.

He was well known as a sportsman. He was a member of the class of 1918, Princeton University, Ridgewood Country Club, Pine Valley Golf Club, The Princeton Club of New York, and life member of the New York Athletic Club.

• CLASSIFIED ADVERTISEMENTS •

POSITION WANTED: Chemist, *27*, *2½* years protective clothing, 1½ years production planning experience. Prefer position production, textile finishes or allied field. Executive caliber. Metropolitan area preferred. Write Box No. 511.

TECHNICAL SALES REPRESENTATIVE: Wanted by well-established sizing specialists to help develop line of textile auxiliaries and finishes. Require: young man, at least 5 to 10 years' experience in wet processing and finishing, good sales personality. Good salary for right man, excellent future. Southeast. Write Box 344.

TEXTILE CHEMIST: Well established manufacturer NYC area seeking textile chemist with extensive knowledge and experience in manufacture and development of textile auxiliaries. Knowledge of dyeing and finishing preferable. Excellent prospects for right man. Write Box No. 420.

WANTED: Technical Sales Agents by basic chemical manufacturers with over twenty years' experience in textile field. Write, giving experience in wet processing and finishing. If you have the contacts, we will furnish the products, research facilities and advertising support. Write Box No. 485.

WANTED: Salesman for textile detergents and specialties. Excellent opportunity for advancement with a growing firm. State age, experience and education. Write Box No. 507.

Prosperous Southern Chemical manufacturing firm desires to contact a full fashioned dyer to represent them in North Carolina and Tennessee. The job entails considerable traveling but only occasional week-ends away from home. This position will guarantee basic salary, bonus if and when earned by the company as a whole and liberal traveling expenses and car mileage. If no car, will purchase one. We cover paint, air conditioning, full fashioned, seamless and bleachery fields. All letters in strictest confidence.

Write Box No. 509

POSITION WANTED: CHEMICAL ENGINEER, CHEMIST, Master's degree. 11 years diversified experience including research, development, complete production and plant supervision, textile chemical specialties, detergents. Duties have required customer contact, familiarity with textile plant operations. Presently employed. Desire position of responsibility offering opportunity in small or medium sized organization. Write Box No. 517.

POSITION WANTED: Dye chemist, graduated. *22* years experience in the organic field, including 9 years as dye chemist; research, development and production, intermediates, cotton-wool-acetate dyes. Executive ability. Metropolitan area preferred. Write Box No. 512.

POSITION WANTED: Organic chemist, Ph.D., *37*, with 13 years of varied and responsible experience including surface active agents, water and fireproofing, softeners, thickeners, resins, coatings, waxes, emulsions, fat derivatives, synthesis. Available at once. Now in New York City area. Write Box No. 513.

OPPORTUNITY FOR TEXTILE CHEMICAL SPECIALTY SALESMAN. The man we are looking for is at present employed, has had ten years or so successful experience in the building up of a following either in New England, Southern territory, or Pennsylvania. To such a man we offer an opportunity of a connection with a progressive, well equipped and financially sound manufacturer of a complete line of textile chemical specialties. To the right man we offer a liberal drawing and commission arrangement with a chance to obtain an interest in our business. Write Box No. 514.

WANTED: Textile graduate interested in making dyeing as a career. Will train. Write Box No. 515.

DYESTUFFS SALESMEN WANTED

Old established dyestuffs firm offers opportunity to dyestuffs salesmen with substantial following in the Textile, Paper, Leather and Printing Ink Industries. Territories open: New England, Northeastern states. Commission basis. Reply stating experience. Strictly confidential. Write Box No. 516.

CHEMIST WANTED: With M.S. or B.S. degree for research and development work with large textile company on finishing and dyeing rayon fabrics. Write Box No. 518.

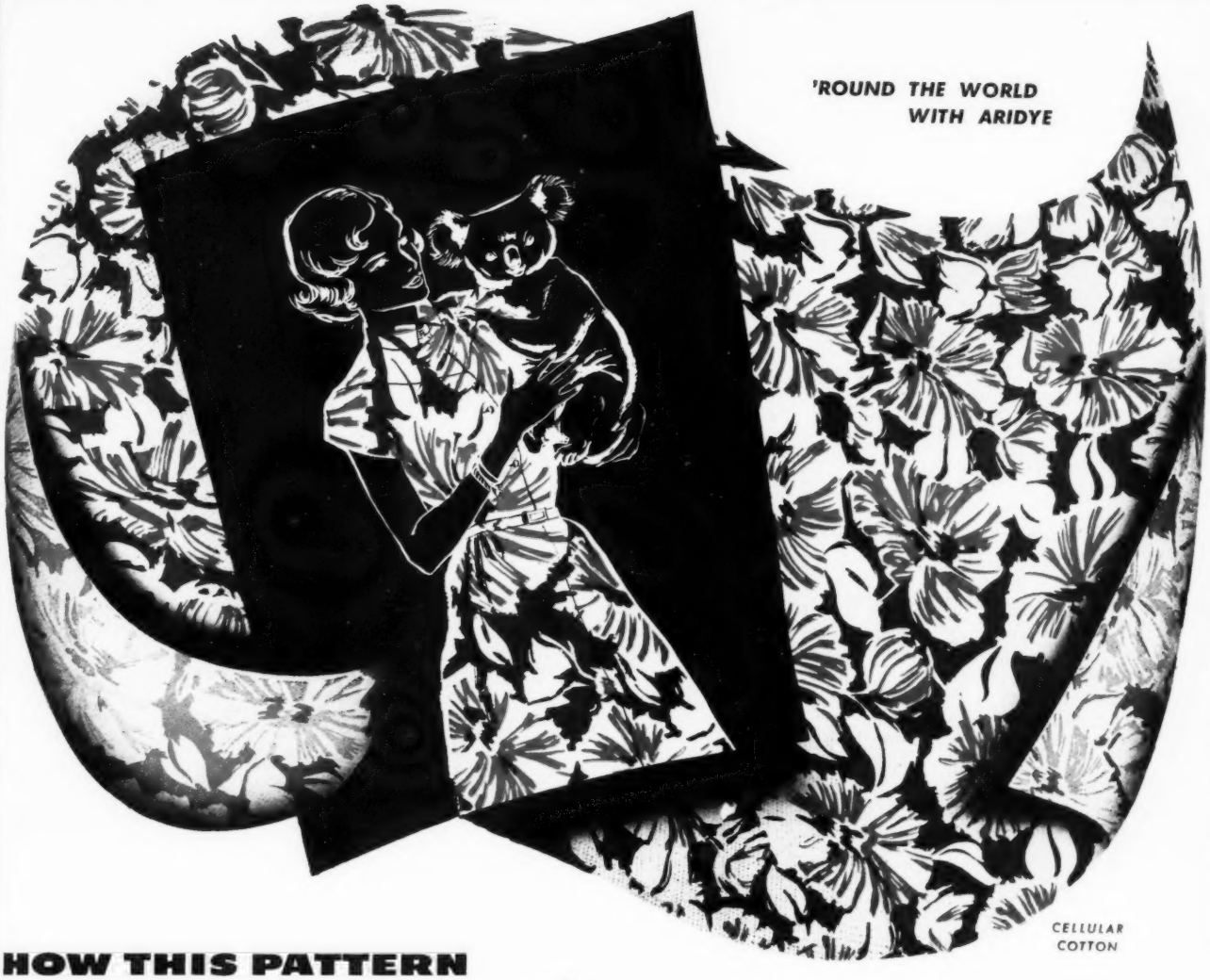
ANALYTICAL CHEMIST WANTED: for non-routine analyses of textile specialties with large textile company. Opportunity to utilize or develop skill in many different analyses. Some practical experience with fats, detergents, resins, dyes, or textiles desirable, but not essential. Write Box No. 519.

SALESMAN: Well established Mfr. of Soaps, Oils and Allied Products for the Textile Trade desires representation in New England. Knowledge of application and contact with the Dyeing and Finishing trade preferred. Replies confidential. Write Box No. 520.

WANTED: CHEMIST for development and application of textile auxiliaries. Several years experience in textile processing required. Submit qualifications and salary requirements. Write Box No. 521.

POSITION WANTED: New England preferred, Textile chemist, 3½ years Lowell Textile Institute, 25 years experience raw stock dyeing, dye testing, evaluation of dyestuffs, physical testing. Write Box No. 524.

See Page (XXX) For Additional Classified Ads



HOW THIS PATTERN WAS PRINTED IN—*Australia*

Printex Pty. Ltd. a leading screen printer in Sydney, Australia, selected Aridye® Pigment Colors for this gay, fast-color design on Cellular Cotton. They began using Aridye colors about two years ago after learning of the simplicity with which pigmented water-in-oil emulsions can be applied either for machine or screen printing.

The floral pattern was printed with Aridye Blue FC2G, cut with Aridye Clear 6214. The dark blue was cut 1:10, and the light blue 1:100. After printing in the usual way, it was then merely air dried and heat treated to provide maximum fastness to washing and dry cleaning. *No ageing, soaping, washing, or other acid treatment was necessary.*

Aridye's ease of application and numerous other advantages are solving problems for progressive textile printers in many parts of the world. An Interchemical textile representative will be glad to discuss the numerous ways in which they will be of benefit to *you*. For full details, write to Interchemical Corporation, Textile Colors Division—Pioneers in Pigment Colors for Textiles—Box 357, Fair Lawn, N. J.

CHECK THESE EIGHT ADVANTAGES

Sharpness of Mark • Exceptional Fastness to Sunlight
Uniformity of Shade • Fastness to Washing • Bright Colors
Economy • Ease of Application • No Impairment of Hand

Aridye *Pigment colors*

INTERCHEMICAL CORPORATION, TEXTILE COLORS DIVISION • FAIR LAWN, N. J. • ROCK HILL, S. C. • PROVIDENCE, R.

Sole Distributor for Australia: John Beith & Co., Pty. Ltd., Union House, George St., Sydney

ONE COLOR FOR BOTH DYEING AND PRINTING

INTERCHEM ACETATE ORANGE 4R

Interchem® Acetate Orange 4R gives you these advantages:

Produces brilliant reddish orange shade at all concentrations.

Suitable for both dyeing and application printing and for discharge printing in light and medium shades.

Excellent as a self shade and for producing compound shades, especially good for shading blacks.

Can be applied either on jigs or boxes at temperatures from 160 to 190° F.

Disperses rapidly and completely when pasted with warm water.

No specking, no tarring—hence fewer redyes, fewer seconds.

For complete information and sample of Interchem Acetate Orange 4R write to:

Interchemical Corporation—Textile Colors Division
Box 357, Fair Lawn, N. J.

Interchem TRADE MARK Dyes

We Carry Full Stocks

Acetate Colors
Fugitive Tints
Direct Colors
Fast Color Bases and Salts
ANDOTEX* Pigment Printing Colors for Textiles**

* Reg. U. S. Pat. Off.

** Southern Representatives

BLACKMAN-UHLER CO., INC.
Spartanburg, S.C.

QUALITY RICHMOND PRODUCTS

RICHSPIN

THE OIL FOR
WORSTED and WOOL SPINNING

Emulsifies very easily and completely

- Cuts static to a minimum
- Scours out completely
- Does not oxidize
- Contains no mineral oil
- Does not turn rancid
- Lubricates the fibre
- Penetrates through

RICHSPIN may be emulsified with any mild alkali. Borax does very well.

Samples and More Detailed Information Upon Request

Southern Office
617 JOHNSTON BLDG., CHARLOTTE, N. C.
CHARLOTTE 2-1428

RICHMOND OIL, SOAP & CHEMICAL CO., Inc.
1041-43 FRANKFORD AVE., PHILADELPHIA 25 PA

ACID ALIZARINE BLUE B — Pr. 93

ALIZACHROME BLUE BLACK B — C.I. 1085

recommended for

ARMY and AIR CORPS DRESS UNIFORMS

Our laboratories are always at your service

ZINSSER & COMPANY, Inc.
ESTABLISHED 1897
Manufacturing Chemists
HASTINGS-ON-HUDSON NEW YORK

COMMONWEALTH
COLOR & CHEMICAL CO.

More than forty years' experience in the manufacture of Chemical Specialties, Dyestuffs and Dyewoods for the Textile and Allied Trades . . .

MAIN OFFICE AND WORKS:
NEVINS, BUTLER and BALTIC STREETS, BROOKLYN 17, N. Y.
PHILADELPHIA • CHICAGO • GLOVERSVILLE • MONTREAL

"TITAN for QUALITY"

DYES, DETERGENTS and TEXTILE SPECIALTIES

★

The Impossible is "that" which we have not yet tried to do

TITAN CHEMICAL PRODUCTS
INCORPORATED
MILL ROAD and WAYNE STREET
JERSEY CITY 6, NEW JERSEY
Representatives in: HINSDALE, N. H., KNOXVILLE, TENN.

Ten ways to use the Gurley Permeometer*

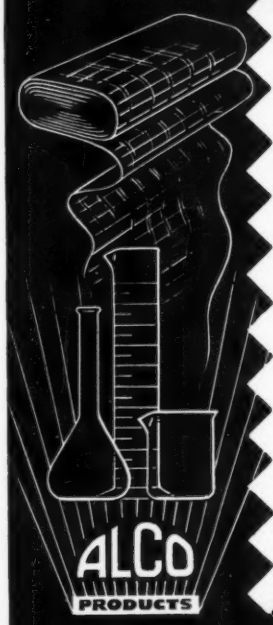
Here's the versatile instrument for quickly and accurately measuring air permeability of fabrics which permit passage of from 1 to 400 cubic feet of air per square foot area at a pressure drop of 0.5" of water. Write for Bulletin No. 1600. W. & L. E. Gurley, 512 Fulton, Troy, N. Y.

GURLEY
Scientific Instrument Makers Since 1845

*Conforms to ASTM "Tent. Meth. of Testing for Air Permeability of Text. Fabrics" D737-43T.

Use the Gurley Permeometer for measuring:

1. *Wind-proofness* of cloth.
2. *Quality* of filter cloth.
3. *Use requirement* of cloth intended to resist or pass air.
4. *Water-resistant* properties.
5. *Coolness* or *warmth* of clothing material.
6. *Construction* of cloth.
7. *Penetration* into cloth of various coatings.
8. *Retention of fillers, starch and sizing* in cloth after laundering or cleaning.
9. *Compactness, nap* or *fiber arrangement* in cloth after fulling, washing, sizing or other treatments.
10. *Amount of wear* after abrasion tests.



TRENAMINE D-25

..FOR SCOURING AND DYEING..

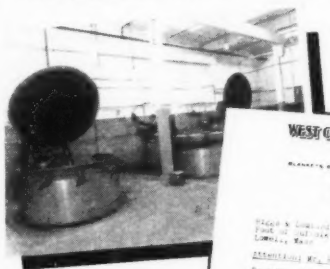
RUBBERIZED PILE FABRICS

ALCO OIL & CHEMICAL CORPORATION
TRENTON AVE. and WILLIAM ST., PHILADELPHIA 34, PA.

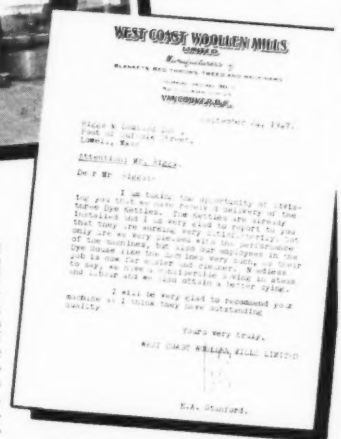
SOUTHERN DISTRIBUTORS
WICA COMPANY INC.
CHARLOTTE, N.C.

The Fleet Line

***STAINLESS STEEL STOCK DYE KETTLE**



"Outstanding Quality"


WEST COAST WOOLLEN MILLS
LIMITED

Installation at West Coast Woollen Mills

The letter reproduced here is the unsolicited opinion of one mill man about Fleet Line Stainless Steel Stock Dye Kettles. It reflects the general feeling of those who know, those who are using this equipment, that this dye kettle has no equal.

* Reg. U. S. Pat. Off. — Patents #2410214, 2275818 and 1863784.

RIGGS AND LOMBARD
INCORPORATED
FOOT OF SUFFOLK ST., LOWELL, MASS.

---

ccc

We are pleased to announce our appointment as American representative of Wm. Butler & Co. (Bristol) Ltd., British Tar Distillers since 1843.

We will distribute a wide range of British-made coaltar chemicals and, in addition, will continue our regular business operations as heretofore.

COALTAR CHEMICALS CORPORATION
William D. Neuberg, President
GRAYBAR BLDG., 420 LEXINGTON AVE., NEW YORK 17, N.Y.
TELEPHONE: MURRAY HILL 5-9508
CABLE: "COALTARKEM"

• CLASSIFIED ADVERTISEMENTS •

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery wanted or for sale—the rate is $7.50 per column inch or less per insertion.

WANTED
CHIEF INSTRUCTOR FOR NEW INDUSTRIAL SCHOOL

Excellent opportunity for qualified person to serve as chief instructor for an industrial, customer-training school. This is a new phase of a long established company in expanding its services to consumers. Prefer applicant between the ages of 28 and 40; a graduate of chemical engineering or textile school with experience in spotting or cleaning business, and a knowledge of training techniques. Apply by letter, giving a resume of previous experience, personal data and salary desired. Write Box No. 526.

WOMAN CHEMIST: College graduate, preferably (but not necessary) experienced in routine qualitative and quantitative analysis. Testing dyes and other analytical work. Permanent position for qualified woman with medium sized company in vicinity of Newark. Write Box No. 522.

Old established textile specialty manufacturers located in New York seeks services of experienced salesman in New England. Salary, commission and traveling expenses paid. Write Box No. 525.

TEXTILE CHEMIST—Research and development work in a well-established Northeastern New York concern. Dyeing and processing experience on natural and synthetic fibers preferred. In replying state age, training, experience and give references. Write Box No. 523.

DYER WANTED AT ONCE—Young man experienced in continuous dyeing, vat and sulphur colors, cotton piece goods, for a New England finishing plant. Good opportunity for advancement. State fully experience and qualifications in reply. Write Box No. 527.

POSITION WANTED: Textile Chemist with years of experience in cotton, rayon and silk dyeing, printing and finishing, also research and development of textile chemical products, and finishes desires permanent position. Excellent training and references. Eastern U. S. location preferred. Write Box No. 528.

FOR ADDITIONAL CLASSIFIED ADVERTISEMENT SEE PAGE 740

Have you ordered a Binder for your Reporter copies?

Maroon leatherette, gold lettered, large enough to hold twenty-six issues, only $3.50 post-paid.

Please send check with order to:

AMERICAN DYESTUFF REPORTER

ONE MADISON AVENUE

New York 10, N. Y.

LeaTex

The name that means leadership in

CHEMICAL SPECIALTIES

for the TEXTILE INDUSTRY

"Always Reliable"

LEATEX CHEMICAL COMPANY
2722 N. HANCOCK ST., PHILADELPHIA, PA.

a pre-dyeing Nylon Hosiery Scour— safe, speedy, efficient

Equally effective for rayon hosiery and mixtures—woolen and cotton yarns and piece goods—Laurel Triconates, powdered detergents, remove sizing and other foreign matter quickly, safely. Produce clean, soft condition that assures level dyeing—clear shades. For hosiery, can be used in single or split-bath method and in combination with other detergents.

Laboratory and mill-tested Laurel Triconates have won favor with leading hosiery mills and processors because of their high efficiency and economy. Send today for sample and recommendations for use.

soaps, oils, finishes

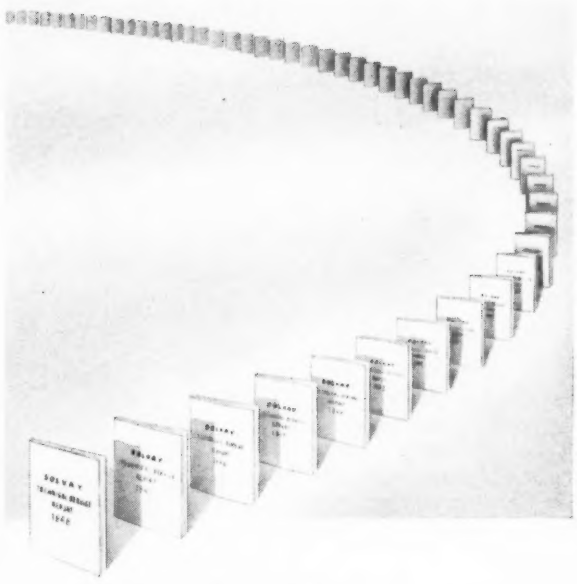
LAUREL SOAP MANUFACTURING CO., Inc.

Wm. H. Bertolet's Sons

ESTABLISHED 1909

WAREHOUSES
Paterson, N. J.
Chattanooga, Tenn.
Charlotte, N. C.

OFFICES
2601 East Tioga Street
Philadelphia 34, Pa.



CAN YOU USE 67 YEARS OF TECHNICAL EXPERIENCE?

Solvay—the pioneer alkali manufacturer in America—offers your technical department a *special* type of technical service . . . to help solve your production problems involving the use of alkalies.

Solvay Technical Service—with a background of 67 years of accumulated knowledge and experience—is set up on an "industry-wise" basis. It consists of men who are field specialists in individual industries. For this reason, manufacturing and processing executives have come to depend on SOLVAY TECHNICAL SERVICE. They have found that this staff of experts thoroughly knows the individual industry and its complex problems.

Put this specialized talent to work for you the next time you have a production problem involving alkalies and associated chemicals. Let a SOLVAY TECHNICAL SERVICE field specialist *in your industry* help you find the right answer. There is no cost or obligation . . . and the strictest confidence is assured.

Industry-Wise
SOLVAY Technical Service
Specialists in Specific Industries

SOLVAY SALES DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

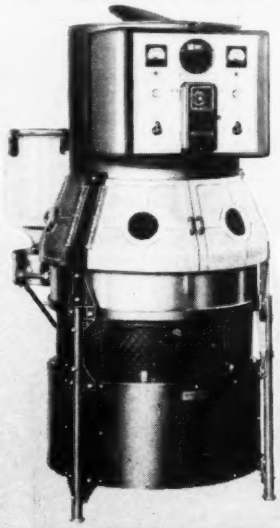
BRANCH SALES OFFICES:
Boston • Charlotte • Chicago • Cincinnati • Cleveland • Detroit
Houston • New Orleans • New York • Philadelphia • Pittsburgh
St. Louis • Syracuse

• INDEX TO ADVERTISERS •

Alco Oil & Chemical Corp.	XXIX
Althouse Chemical Co., Inc.	Second Cover
Amalgamated Chemical Corp.	
American Aniline Products, Inc.	VII
American Cyanamid Co. (Ind. Chem. Div.)	Back Cover
American Dyewood Company	
American Key Products, Inc.	
Arkansas Company, Inc.	VI
Armour & Co.	
Arnold, Hoffman & Co., Inc.	
Atlantic Chemical Co., Inc.	
Atlantic Refining Company, The	IX
Atlas Electric Devices Co.	XXXIII
Barry Chemical Co.	
Becco Sales Corp.	XXXIII
Blackman-Uhler Co., Inc.	XXVII
Blickman, Inc., S.	
Burkart-Schier Chemical Co.	XXXII
Butterworth Sons Co., H. W.	XXXIV
Calco Chemical Division, American Cyanamid Co.	
Calgon, Inc.	
Campbell & Co., Inc., John	
Carbic Color & Chemical Co., Inc.	XXII
Carbide & Carbon Chemicals Corp.	
Chem-Col Co., Inc.	
Ciba Company, Inc.	
Clover Chemical Co.	
Coaltar Chemicals Corp.	XXIX
Colgate-Palmolive-Peet Co.	
Commonwealth Color & Chemical Co.	XXVIII
De Paul Chem. Co., Inc.	
Drew & Co., Inc., E. F.	
Du Pont de Nemours & Co., E. I.	
Dyestuff Division	Front Cover
Fine Chemicals Division	XXI
Fancourt & Co., W. F.	
Geigy Company, Inc.	
General Chemical Division, Allied Chemical & Dye Corp.	
General Dyestuff Corp.	XIII
Girdler Corp., The	
Grinnell Co., Inc.	
Gross & Co., A.	
Gurley, W. & L. E.	XXVIII
Hardesty Co., W. C.	
Hart Products Corp.	
Hercules Powder Co.	
Heyden Chemical Corp.	
Hooker Electrochemical Co.	
Houghton & Co., E. F.	
Interchemical Corp., Textile Colors Div.	XXV, XXVI
International Nickel Co., Inc.	
International Salt Co., Inc.	
Kelco Co.	V
Koppers Co., Inc.	
Laurel Soap Mfg. Co., Inc.	XXXI
Leatex Chemical Co.	XXX
Leeds & Northrup Co.	
MacBeth Corp.	
Maher Color & Chemical Co.	XV
Mathieson Chemical Corp.	
Maywood Chemical Works	
Monsanto Chemical Co.	X, XI
National Aniline Division, Allied Chemical & Dye Corp.	XIX
National Carbon Co., Inc.	
Napco Chemical Co.	
Nova Chemical Corp.	
Nyanza Color & Chemical Co.	
Onyx Oil & Chemical Co.	XVII
Orleans Co., Inc.	
Pabst Sales Company	
Perkins & Sons, Inc., B. F.	
Peuchot Color & Chemical Co.	
Procter & Gamble	
Refined Products Corp.	III
Richmond Oil Soap & Chemical Co., Inc	XXVII, XXXIII
Riggs & Lombard, Inc.	XXIX
Rohm & Haas Company	XXIV
Rona & Co., Inc., L. L.	
Royce Chemical Co.	
Rumford Chemical Works	
Sandoz Chemical Works, Inc.	
Scholler Bros., Inc.	Third Cover
Sindar Corp.	
Smith, Drum & Co.	
Socony-Vacuum Oil Co., Inc.	
Solvay Sales Div., Allied Chemical & Dye Corp.	XXXI
Sonneborn Sons, Inc., L.	
Standard Brands, Inc.	
Standard Chemical Products, Inc.	
Stein Hall & Co., Inc.	
Tennessee Eastman Corp.	
Titan Chemical Products, Inc.	XXVIII
Truitt Mfg. Co.	
Union Carbide & Carbon Corp.	
United Chemical Prod. Corp.	
Van Vlaanderen Machine Co.	XVI
Vellner, Eugene	
Virginia Smelting Co.	
Wallerstein Co., Inc.	
Warwick Chemical Co.	
Watson-Park Company	IV
Wolf & Co., Jacques	XII
Young Co., J. S.	
Young Aniline Works	
Zinsser & Co., Inc.	XXVII
Zurn Co., O. F.	

FADE-OMETER

for accelerated color fading



• Originated and made solely by Atlas. Used all over the world and accepted as the standard color testing machine by the textile industry for over a quarter of a century.

Specimens are rotated around the Atlas Enclosed Violet Carbon Arc—the closest approach to natural sunlight. Temperature automatically controlled. No loss of light intensity of arc during life of machine.

ATLAS ELECTRIC DEVICES CO., 361 W. Superior Street, Chicago, Ill.

ATLAS-OMETERS

WEATHER-OMETER ★ LAUNDER-OMETER ★ FADE-OMETER

QUALITY RICHMOND PRODUCTS

ATTENTION HOSIERY DYERS

use

DYETEX

FOR BETTER SCOURING AND DYEING

DYETEX for boiling off and dyeing nylon hosiery more effectively and economically than soap.

DYETEX not only removes size and coning oils easily, but also needle oils, residues from needle cleaners, etc., are removed. In addition, they are held in solution so that when a scour bath is dropped, the residues drop with it.

DYETEX in dye baths, acts as a dispersing and levelling agent. While it will not do the work of a dyer, it will make his work easier.

SAMPLES AND MORE DETAILED INFORMATION UPON REQUEST

Southern Office
617 JOHNSTON BLDG., CHARLOTTE, N. C.
CHARLOTTE 2-1428

RICHMOND OIL, SOAP & CHEMICAL CO., Inc.

1041-43 FRANKFORD AVE., PHILADELPHIA 25, PA.

BECCO HYDROGEN PEROXIDE

Make full use of

BECCO TECHNICAL CONSULTATION

Becco technical engineers have a wealth of knowledge and practical experience to bring to your bleaching requirements. Becco laboratories have accumulated a large amount of valuable data applicable to your problems.

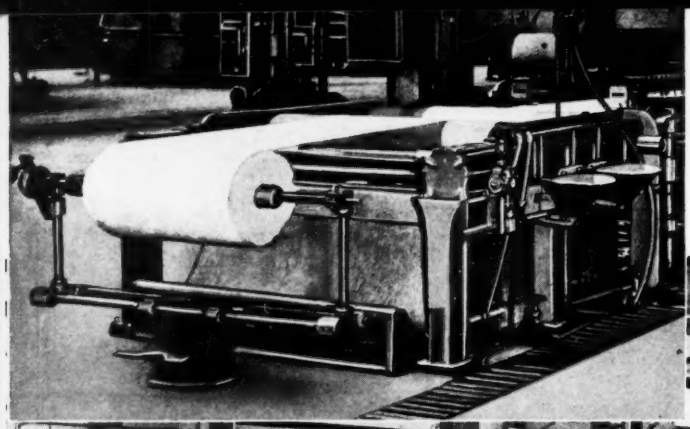
Let this Becco service assist you in producing higher quality, lower cost, uniform bleaching of all fibres by all methods—including continuous bleaching. Write or call—at no obligation.

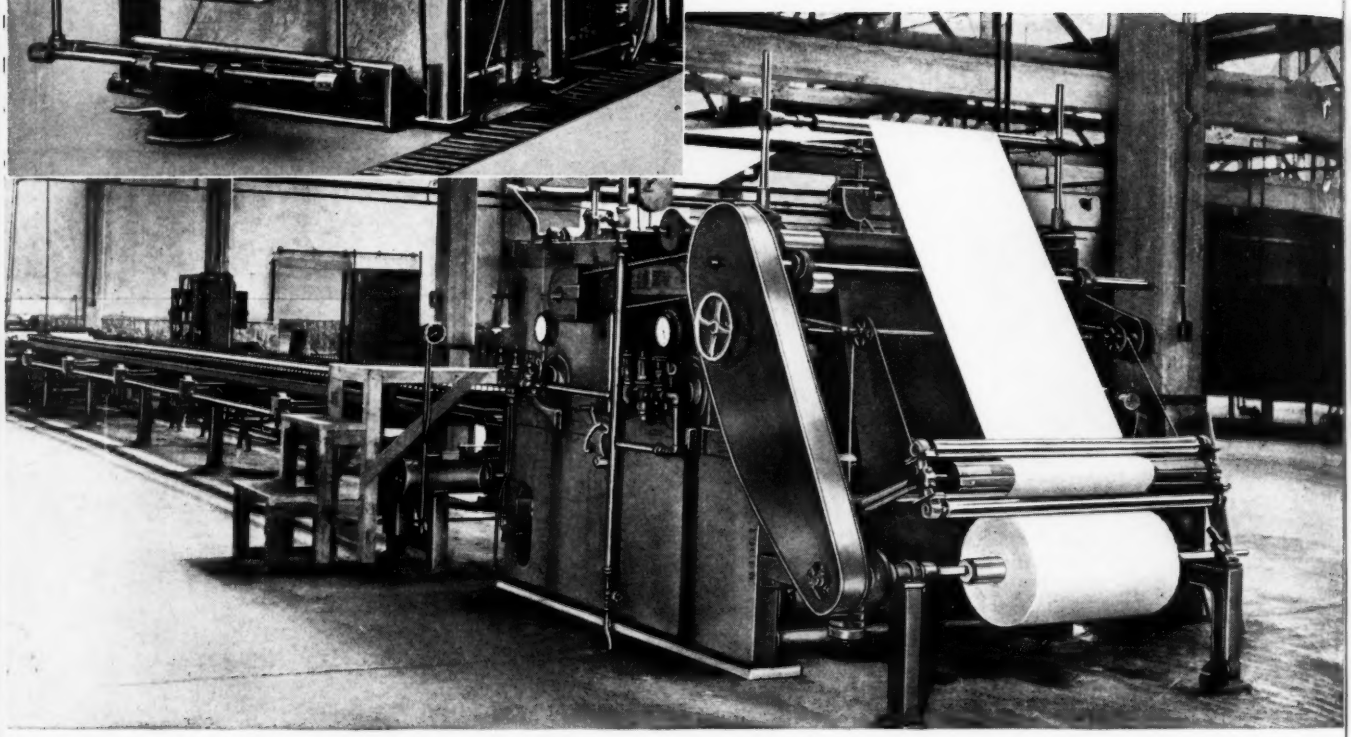
BECCO SALES CORPORATION

AGENTS FOR BUFFALO ELECTRO-CHEMICAL COMPANY, INC.

BUFFALO 7, NEW YORK

New York Boston Philadelphia Chicago Charlotte





Why Butterworth Builds a Palmer Range *this* way

Take a practical mill man's word for it—the latest type Butterworth-built Palmer Finishing Range gives more production and better tension control than ever before possible. It includes these Butterworth Machines:

(a) 4-roll horizontal Pad or Quetsch;
(b) 60-foot straight automatic Tenter with automatic rail guiders at entering end;
(c) Palmer finishing unit with 60-inch diameter Cylinder and Winder.

This high-speed range is driven by AC-DC generator set with individual motors on Pad and Tenter. There are specially designed tension controls between each unit.

We built this latest-type Palmer Range with practical mill men offering suggestions and criticism at every stage. It put our design department on the spot—but we like it that way. And so do our customers.

Let us tell you about the results in terms of increased production and better finishing.

Butterworth

H. W. BUTTERWORTH & SONS CO., Phila. 25, Pa.

PROVIDENCE DIVISION, Providence, R. I. - 1211 Johnston Bldg., Charlotte, N. C. - W. J. Westaway Co., Hamilton, Ont. - ARGENTINA: Storer & Cia., Buenos Aires - AUSTRALIA: Noel P. Hunt & Co., Ltd., Melbourne - BELGIAN CONGO: Paul Pflieger & Co. - BOLIVIA: Schneiter & Cia., Ltda., La Paz - BRAZIL: Cia. Industria e Commercia, Sao Paulo e Rio de Janeiro - CHILE: Schneiter & Cia., Ltda., Santiago - COLOMBIA: C. E. Halaby & Co., Medellin - CUBA: Thos. F. Turrull, Havana - ECUADOR: Richard O. Custer, S. A., Quito - FRANCE: Georges Campin, Le Perreux, Seine; Rene Campin, Sceaux, Seine - MEXICO: Slobotzky, S. A., Mexico, D. F. - MIDDLE EAST, MEDITERRANEAN, BALKANS, AUSTRIA, HUNGARY, CZECHOSLOVAKIA, INDIA: Arlind Corporation - NORWAY: Dr. Ing. Otto Falkenberg, Oslo - PERU: Custer & Thommen, Lima - SOUTH AFRICA: Texmaco, Johannesburg - SWEDEN: Elof Hansson Goteborg - URUGUAY: Storer & Cia., Ltda., Montevideo - VENEZUELA: Herbert Zander & Co., Caracas.

SHADES OF VENUS

The ancient Greek "glamour girl" had few of the "adornments" available to her modern counterpart of 1948. Incidentally, we doubt if she was really more beautiful or alluring; certainly, she never had sheer, soft, smoky-dull hosiery to encase those shapely legs (lovely hosiery, made even more lovely by *DuraBeau Finishes*).

DuraBeau Finishes, in addition to *beautifying,* impart the famous "*film of protection,*" which assures *added resistance* to spots, snags and runs,—thus, giving the lady of 1948 "miles more wear" per pair.

DuraBeau
Reg. U. S. A. and Canada
TEXTILE FINISHES

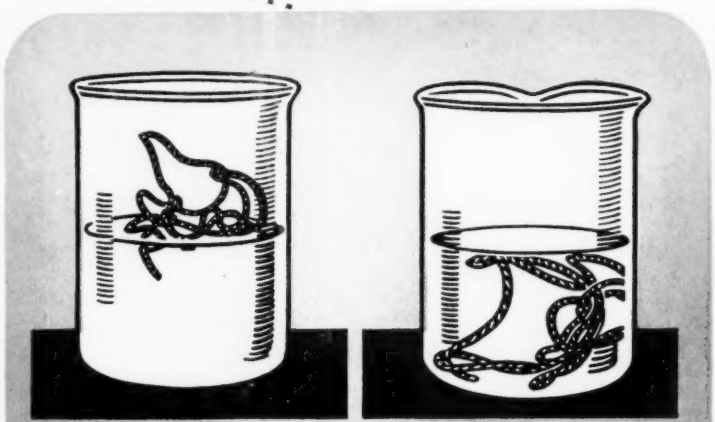
SCHOLLER BROS., INC. Mfrs. of Textile Soaps, Softeners, Oils, Finishes • Collins & Westmoreland Sts., Phila. 34, Pa. • St. Catharines, Ont., Can.

FOR IMMEDIATE SINKING IN WATER . . .

IN IMMEDIATE SUPPLY . . .

AND IMMEDIATE DROPPING IN COSTS . . .

STANDARDIZE AT THE QUALITY LEVEL WITH . . . DECERESOL OT Wetting Agents



An example of the unmatched performance of DECERESOL OT Wetting Agent. At left, yarn floats indefinitely on water. At right, one drop of DECERESOL OT Wetting Agent causes instantaneous wetting and immediate penetration.

You get speedier application in the wetting of textiles – better penetration, dispersing and dye levelling properties – when you standardize on Cyanamid's DECERESOL° OT Wetting Agents, now again available in larger quantities.

But that is only *one* side of the story. DECERESOL OT Wetting Agents are also very economical to use. A little of it goes a long way. Its efficiency lowers costs, saves time.

And don't forget this *third* important advantage: the continual use of DECERESOL OT Wetting Agents results in *higher quality production*, as well.

If you are not now using DECERESOL OT Wetting Agents, it will pay you to write for further information about these superior wetting agents. Or, if you wish, one of our representatives will be glad to call and demonstrate DECERESOL OT Wetting Agents to you personally.

AMONG CYANAMID PRODUCTS FOR THE TEXTILE INDUSTRY ARE . . . AQUASOL° Sulfonated Castor Oils; NO-ODOROL° Finishing Oils; DECERESOL° OT Wetting Agents; PARAMUL°° 115 Water Repellent; Penetrants, Softeners, Finishes, Sizing Compounds, and other specialties and Heavy Chemicals. For low-cost chemical equivalent of distilled H_2O . . . FILT-R-STIL° Demineralizing Units.

SALES OFFICES: Boston, Mass.; Philadelphia, Pa.; Pittsburgh, Pa.; Baltimore, Md.; Charlotte, N. C.; Cleveland, Ohio; Cincinnati, Ohio; Chicago, Ill.; Detroit, Mich.; Kalamazoo, Mich.; St. Louis, Mo.; Los Angeles, Calif.; San Francisco, Calif.; Seattle, Wash. In Canada: Dillons Chemical Co., Ltd., Montreal and Toronto.

°Reg. U. S. Pat. Off. °°Trademark

American Cyanamid Company

Industrial Chemicals Division

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.